

# **COORDINATING OPERATIONAL FIRES FOR THE TWENTY-FIRST CENTURY**

**A MONOGRAPH  
BY  
Major Gregory B. Schultz  
Infantry**



**School of Advanced Military Studies  
United States Army Command and General Staff  
College  
Fort Leavenworth, Kansas**

**Second Term AY 97-98**

*Approved for Public Release Distribution is Unlimited*

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE  
21 May 1998

3. REPORT TYPE AND DATES COVERED  
Monograph

4. TITLE AND SUBTITLE

Coordinating Operational Fires for the  
Twenty-first Century

5. FUNDING NUMBERS

6. AUTHOR(S)

Major Gregory B. Schultz

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

School of Advanced Military Studies  
Command and General Staff College  
Fort Leavenworth, Kansas 66027

8. PERFORMING ORGANIZATION  
REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Command and General Staff College  
Fort Leavenworth, Kansas 66027

10. SPONSORING / MONITORING  
AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT

APPROVED FOR PUBLIC RELEASE:  
DISTRIBUTION UNLIMITED.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)  
SEE ATTACHED

19981221 028

14. SUBJECT TERMS

Operational Fires  
Joint Force Fires Coordinator  
Operational Firepower  
Deep Attack  
Interdiction  
Joint Fire Support

15. NUMBER OF PAGES

166

16. PRICE CODE

17. SECURITY CLASSIFICATION  
OF REPORT  
UNCLASSIFIED

18. SECURITY CLASSIFICATION  
OF THIS PAGE  
UNCLASSIFIED

19. SECURITY CLASSIFICATION  
OF ABSTRACT  
UNCLASSIFIED

20. LIMITATION OF ABSTRACT  
UNLIMITED

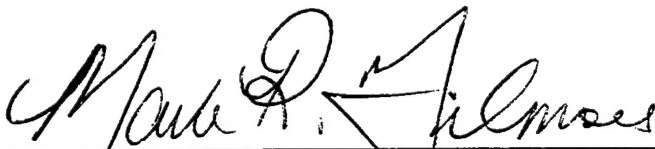
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major Gregory B. Schultz

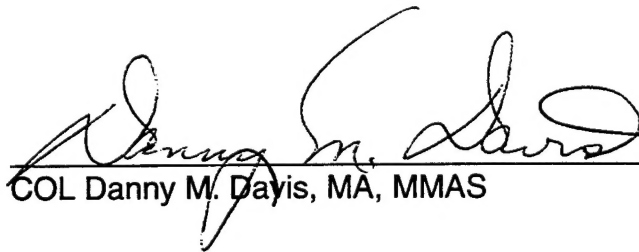
Title of Monograph: *Coordinating Operational Fires for the Twenty-First Century*

Approved by:



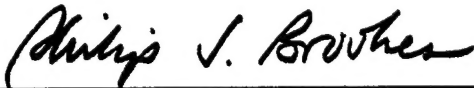
LTC Mark R. Gilmore, BS, MMAS

Monograph Director



COL Danny M. Davis, MA, MMAS

Director, School of Advanced  
Military Studies



Philip J. Brookes, Ph.D.

Director, Graduate Degree  
Program

Accepted this 21st Day of May 1998

## **ABSTRACT**

### **COORDINATING OPERATIONAL FIRES FOR THE TWENTY-FIRST CENTURY by MAJ Gregory B. Schultz, USA, 62 pages.**

Operational fires have played an increasingly vital role in the campaign plans of Joint Force Commanders as technology has increased the ability to identify, target, and engage enemy forces, facilities, and functions throughout the depth of the battlefield. In the past, operational fires, in the form of air interdiction, have predominantly been the responsibility of the Air Force since they have possessed the systems to range and engage the enemy effectively at operational depths. New and developing capabilities like JSTARS, ATACMS, Extended Range MLRS, Apache Longbow, and brilliant munitions, are increasing the complexity, potential, and joint nature of operational fires. These capabilities have contributed to the increased emphasis on joint operations and has led to considerable debate on the issue of operational fire planning, coordination, and execution. This monograph examines the need for a Joint Force Fires Coordinator (JFFC) to help maximize the potential of operational fires.

To determine whether a JFFC is needed, this paper first examines the nature and concept of operational fires from contextual and doctrinal perspectives. This is done by reviewing the historical background and development of operational fires and the Army, Air Force, and Joint doctrine regarding operational fires and interdiction planning, coordination, and execution. Using the criteria of effectiveness, efficiency, and unity of effort, this paper then reviews the experiences of joint and service component planners during the Gulf War and identifies problems or shortcomings in current doctrine and procedures.

This paper concludes that shortcomings in joint doctrine, combined with competing interests and perspectives by the component services prevents the optimal use of operational fires. A JFFC with a supporting joint fires coordination element is recommended to help ensure operational fires and interdiction are planned, coordinated, and executed efficiently and effectively and in accordance with the Joint Force Commander's intent.



## TABLE OF CONTENTS

<b>1. Introduction.....</b>	<b>1</b>
<b>2. Background .....</b>	<b>7</b>
World War I .....	7
World War II.....	8
Cold War.....	12
<b>3. Doctrinal Review .....</b>	<b>19</b>
Army Doctrine .....	19
Air Force Doctrine .....	24
Joint Doctrine.....	26
Summary of Doctrinal Review .....	30
<b>4. Historical Review .....</b>	<b>34</b>
The Gulf War .....	34
Conclusions from the Gulf War.....	39
<b>5. Findings &amp; Conclusions.....</b>	<b>42</b>
<b>Endnotes .....</b>	<b>48</b>
<b>Bibliography .....</b>	<b>55</b>

## **CHAPTER 1**

### **INTRODUCTION**

Our Armed Forces' foremost task is to fight and win our nations wars. Consequently, America's Armed Forces are organized, trained, equipped, maintained, and deployed primarily to ensure that our Nation is able to defeat aggression against our country and to protect our national interests.<sup>1</sup>

National Military Strategy, 1997

America's military forces operate under a national mandate to always be prepared to fight and win our nation's wars. The American public further expects that when the country must go to war, the military will win it as quickly and decisively as possible with an absolute minimum of casualties. This expectation has grown greatly after the victory in the Gulf War. To best meet the expectations of the American people, our national military strategy calls for the U.S. Armed Forces to use "decisive force."<sup>2</sup>

Having the capability to apply decisive force anywhere in the world has become a significant challenge as a result of diminishing resources, a significantly smaller military force, and greater dependence on force projection. These challenges require American forces to recommit themselves to effective and efficient joint operations.

Simply to retain our effectiveness with less redundancy, we will need to wring every ounce of capability from every available source. That outcome can only be accomplished through a more seamless integration of service capabilities. To achieve this integration while conducting military operations we must be fully joint: institutionally, organizationally, intellectually, and technically. Future commanders must be able to visualize and create the best fit of available forces needed to produce the immediate effects and achieve the desired results.<sup>3</sup>

Related to the need for joint operations, and also contributing significantly to the potential for battlefield dominance through decisive force is the growing role of deep

operations and the deep attack of enemy forces, facilities and functions. These deep attacks are usually conducted through the use of operational fires (also referred to as operational firepower). Operational fires are one of the six operating systems at the operational level of war.<sup>4</sup> Whereas fire support at the tactical level of war is defined largely by its supporting relationship to maneuver operations, this is not true of operational fires.<sup>5</sup>

Operational fires...are the application of firepower to achieve a decisive impact on the conduct of a campaign or major operation. Operational firepower is by its nature, primarily a joint/combined activity or task. It is a separate component of the operational scheme, but maneuver and firepower must be integrated. Operational firepower is not fire support, and operational maneuver is not dependent on fire. Operational maneuver can be affected by operational firepower.<sup>6</sup>

Operational fires are also defined in terms of their purposes: "they overwhelm the enemy at critical points facilitating operational maneuver; they interdict enemy forces that have not yet joined the tactical fight; or they destroy critical facilities or functions that will adversely affect the enemy's campaign plan."<sup>7</sup> The Air Force does not recognize the term or concept of fires, and instead uses the closely related concept of interdiction.<sup>8</sup> For the purpose of this paper operational fires will include fires, firepower, and interdiction (other than ground maneuver based) at the operational level.

As technological advances have significantly improved the ability of American forces to quickly and accurately identify, target and engage the enemy at operational depths, the demands and expectations for operational fires has increased. As noted by the Secretary of Defense, William J. Perry, "Long-range precision strike weapons, coupled to very effective sensors and command and control systems, will come to dominate much of

warfare...[r]ather than closing with an opponent, the preferable operational mode will be destroying him at a distance."<sup>9</sup>

Today, effective operational fires greatly increase force protection, shape the battlefield to best ensure decisive and overwhelming success in the close fight, and quicker achievement of operational and strategic objectives. New and developing systems for targeting and employing operational fires promises to further enhance the ability of American forces to employ decisive force even when outnumbered and fighting in foreign environments.

The promise of technological advances in operational fires is challenged by the inherent difficulties in making the joint "system of systems" work efficiently and effectively. Deep attack and joint operations at the tactical, operational, and strategic levels have always been complex, but the difficulties are likely to become even greater. The developing capabilities in targeting and attack by all services, combined with greater ability to exploit those effects promises to further complicate the process of planning, coordinating, and executing joint operational fires. These challenges are likely to be even greater in potential conflict environments that involve a higher operations tempo and are more dynamic and non-linear than the Gulf War. The challenge is a real one, and failure to maximize the potential of operational fires will result in wasted resources and wasted lives.

Despite the growing expectations and challenges facing operational fires, joint doctrine and the doctrine of individual services still do not offer a clear and conceptually sound means of planning, coordinating, and executing operational fires. The targeting

process that worked rather effectively in the past is potentially becoming antiquated with the development of new capabilities that allows the Army to plan and fire on targets in portions of the battlefield that was previously the domain of the Air Force. While the importance of synchronizing and coordinating fires is evident, and potential effects of operational fires on the tactical battle are well accepted, currently no doctrinal requirement exists for any one person to serve as the coordinator of operational fires.

The Army has long recognized the need for one individual to head the effort of planning, coordinating, and integrating all the available sources of fires to support the maneuver commander. This individual, the Fire Support Coordinator, helps to ensure that fires are used effectively, efficiently, and in keeping with the force commander's intent. The importance of the Fire Support Coordinator grew over time as the number of different assets for targeting and engaging the enemy, both lethal and non-lethal, increased the complexity of fire support. A similar situation now is developing at the joint forces level in terms of operational fires.

The purpose of this paper is to examine the nature of operational fires, to include interdiction , to determine how they may be better employed in the joint environment. Specifically, this monograph seeks to answer the following research question: Is a joint force fires coordinator needed to maximize the potential of operational fires? The significance of this question becomes self-evident when considering the role of operational fires in achieving decisive force and contributing to the overall success and effectiveness of the joint force commander's deep attack operations. There are at least three reasons this issue must be of concern to America's warfighters:

- Effective deep attack capabilities contribute significantly to a joint force commander's ability to dictate the terms of conflict.
- Successful deep attack operations reduce both the number of close combat forces that are needed and the number of close combat casualties that are likely to be incurred.
- Organization and employment of deep attack resources can have a major impact on overall force effectiveness and costs.<sup>10</sup>

The cost of failing to achieve and direct such force efficiently may lead to protracted and even inconclusive campaigns that are paid for in American lives and wasted combat power.<sup>11</sup>

Preparing to answer the research question, it should be emphasized that this monograph is limited in three significant ways. First, although operational fires applies to the full spectrum of military operations, this paper deals primarily with conventional mid-to high-intensity wars. Second, the joint nature of operational fires applies to all the services, however, this paper will primarily focus on the interrelationship between the Army, which usually is the service of the Land Component Commander, and the Air Force, which usually is the service of the Air Component Commander. Finally, as is true of any research that deals with the future, assumptions have to be made based on the best available evidence, experimentation, and expert opinions.

To determine whether a joint force fires coordinator (JFFC) is needed to maximize the potential of operational fires, this monograph will first examine the nature and concept of operational fires from a contextual and doctrinal perspective. Reviewing the background on the development of operational fires and the doctrinal position of the Army, the Air Force, and the Joint Staff, a better understanding of the problems and potential of operational fires planning, coordination, and execution is possible. From this

initial analysis, the criteria for analyzing the need for a JFFC will be defined. With a contextual and doctrinal understanding of operational fires, this monograph will use a historical review of the process and use of operational fires during the Persian Gulf War. This historical analysis will help determine if operational fires were employed doctrinally and if there were problems associated with the planning, coordination, and execution of fires. Next, this paper will consider the implications of developing technologies and different combat scenarios on operational fires in the future. Then, using the criteria for analysis, this monograph will answer the research question and, in conclusion, note any recommendations or implications for the future use of operational fires by American forces.

## **CHAPTER 2**

### **BACKGROUND**

To gain a better understanding of operational fires, an examination of the development of deep fires is appropriate. The use of fires for deep attack, whether at the tactical, operational, or strategic level, is the product of advances in applied technology. It is understandable then, that deep fires is a relatively recent development in military history; first truly becoming evident at the beginning of the twentieth century.

### **WORLD WAR I**

While artillery advancements had allowed some tactical deep attacks as early as World War I, shortcomings in the technologies needed to communicate and to target deep behind the enemy lines greatly limited the effectiveness and the depth of fires. Despite technological shortcomings, even limited effectiveness in deep attack proved valuable, and with time both the Germans and the Allies put a great deal of emphasis on tactical deep fires. With the use of long-range artillery groups, and dedicated aerial observers and balloon sections to help identify appropriate targets for deep attack, commanders began to shape the tactical battlefield.<sup>12</sup>

These tactical deep fires were designed specifically to contribute to the success of the close fight by interrupting command and control, suppressing enemy artillery systems, engaging the reserve forces of committed units before they could be employed, and striking the forward lines of communications.<sup>13</sup> The ability to attack deep with fires in support of the close battle significantly contributed to gaining freedom of maneuver by limiting the enemy's ability to employ fires against one's own forces while interdicting



the enemy's attempt to move reserves in response to an attack. By 1918 the use of fires for deep attack had proven so successful that it became the primary focus of fires by both the Germans and the Allies.<sup>14</sup> While the range of artillery and effective observation limited the depth of attack in the First World War, the importance of deep attack had become obvious, and with new technologies and continued emphasis it would reach operational and strategic depths in the next major war.

## WORLD WAR II

By the Second World War, the airplane had advanced far beyond the limited role it played in World War I. It contributed greatly to the growing potential for effective deep attack at the tactical, operational and strategic levels. As the primary means of employing operational firepower during World War II, the experience of air forces to attack deep in support of major operations and campaigns provides a basis for understanding the current use of operational fires. Two excellent examples of the employment of air interdiction as operational fires are the Italian Campaign and the Normandy invasion.

As a result of parceling out air assets to the individual corps commander, airpower was never applied effectively or efficiently during the North Africa campaign. The inability to effectively provide air support contributed to the heavy casualties suffered during the campaign, most notably at the Kasserine Pass.<sup>15</sup> The lessons learned by the Army Air Corps were the basis for a quickly adopted new doctrine, FM 100-20, *Command and Employment of Air Power*. The new doctrine called for airpower to be centrally controlled through the air force commander who could flexibly employ and

concentrate airpower for maximum effect. The doctrine prioritized the use of airpower to first gain air superiority, then conduct air interdiction and third, provide close air support for ground troops.<sup>16</sup> The first opportunity for this new doctrine to be applied was during the Italian Campaign along the Gustav Line.

In early 1944, as Allied and German ground forces were held in a stalemate, the Allied Air Forces unilaterally decided to take advantage of the air superiority they had won to begin operational level attacks to interdict the enemy's lines of communication, effectively cutting off support to the German's fortified defensive Gustav Line. Operation STRANGLE began in March 1944 with an intense and well prepared series of attacks against rail and road networks north of Rome. Allied Air Forces succeeded in cutting the enemy's rail capacity from 80,000 tons per day down to less than 4,000 tons per day; nevertheless, the Germans continued to hold their defenses along the Gustav Line.<sup>17</sup> The failure to coordinate the air and ground efforts prevented the exploitation of operational fires.

Recognizing their failure to coordinate and develop operations as a joint effort, the planners developed new directives for Operation DIADEM, which began on 11 May.<sup>18</sup> With the coordinated and renewed ground offensive supported by close air and continued air interdiction, the German forces, with their supplies greatly diminished, were unable to effectively respond. As allied ground forces attacked and breached defenses, the Germans were unable to quickly block the penetrations or move their reserves because air interdiction "had taken such a toll of trucks and trains, and had done so much damage to bridges, railroads, and roads, that the Germans were dependent on foot power

and animal transport to move anywhere."<sup>19</sup> Operational and tactical fires combined to steal the enemy's limited ability to conduct operational movement and tactical maneuver in response to the allied offensive. Unable to effectively respond to the coordinated allied ground and air offensive, the Germans were forced to begin withdrawing from the Gustav Line. The German withdraw quickly turned into a pursuit as ground forces continued their attacks supported by the unchallenged air attack on any observed enemy forces. Within three weeks Rome was liberated.

The Italian Campaign demonstrated the potential for operational fires to isolate the battlefield, minimize the enemy's ability to move forces and supplies, and set the conditions for decisive tactical maneuver. The campaign also demonstrated the importance of coordinated joint planning and execution to recognize the potential of operational fires and accomplish the commander's campaign objectives. Until ground forces were actively involved in a coordinated joint effort, decisive results were not recognized.

The lessons from the Italian Campaign were known to General Eisenhower and his major subordinate commanders, who recognized the importance of using airpower to attack operational targets in support of Operation OVERLORD, the allied invasion of Normandy. American and British aircraft were used to help isolate the tactical battlefield in support of the campaign plan by attacking the enemy's troop concentrations, traffic along the lines of communication, and the transportation infrastructure that would have supported the German's operational movement of forces and supplies.<sup>20</sup>

The use of operational fires, in the form of air interdiction, played a significant part in the successful invasion of the European mainland. The German operational commander responsible for the defense of the coastline was Field Marshall Erwin Rommel. He noted the impact Allied air interdiction had on his defensive efforts when he wrote:

...the enemy has total command of the air over the battle area up to a point some 60 miles behind the front. During the day, practically our entire traffic--on roads, tracks and in open country--is pinned down by powerful fighter-bomber and bomber formations, with the result that the movement of our troops on the battlefield is almost completely paralyzed, while the enemy can maneuver freely. Every traffic defile in the rear areas is under continual attack and it is very difficult to get essential supplies of ammunition and petrol up to the troops.<sup>21</sup>

Even the rather simplistic use of operational fires during World War II was made difficult for many of the same reasons they are today. One basic problem was balancing the competing demands for aircraft to support strategic or operational plans.<sup>22</sup> Other challenges included an overly complex process for targeting, a defused process for decision-making, and problems associated with a lack of unity of command for operational fires.<sup>23</sup> Before the fall of 1944, the lack of any kind of joint organization specifically responsible for providing expertise and guidance in the planning, coordinating, and executing of operational or strategic fires further hindered the effective and efficient targeting and application of firepower.<sup>24</sup>

The above mentioned problems in the planning, coordination, and execution of operational fires in the Second World War was true despite the fact that almost all such fires were provided by aircraft. This fact at least allowed the relatively effective use of the Bomb Line, a coordination measure used to separate aerial fires and ground maneuver

responsibilities of the services, their respective roles in deep attack, and the command and control measures taken to facilitate the effective employment of operational firepower.

In the early 1960's the Bomb Line was replaced in Army doctrine with the fire support coordination line (FSCL) which served as a permissive fire support coordination measure established by a corps commander to facilitate the clearance of fires and the timely attacks on the enemy.<sup>27</sup> Like the Bomb Line, the FSCL effectively served to divide the battlefield between the Army's responsibility for maneuver and fires, limited to the range of artillery, and Air Force's responsibility for attacking the enemy in depth. Air Force support of Army tactical operations short of the FSCL was termed close air support (CAS), while the Air Force maintained responsibility for operational level fires against the enemy beyond the FSCL using air interdiction (AI).<sup>28</sup>

The 1976 edition of the Army's basic doctrinal manual, *Field Manual 100-5, Operations*, included a chapter titled "Air-Land Battle." This new term was used to describe the doctrinal acknowledgment by the Army that both the ground and air forces were interdependent for intelligence collection, reconnaissance, air defense, movement, electronic warfare, as well as the employment of fires against the enemy.<sup>29</sup> Success in any future war in Europe was going to require the Army and Air Force working in closer cooperation than ever before.

Through analytical studies and close cooperation with the Army on air-ground interface issues, the Air Force also demonstrated a growing commitment to its mission of support to the Army in Europe.<sup>30</sup> Curtailing some of the complimentary efforts to integrate doctrinal concepts between the services was the fact that the Air Force did not

have a single command organization responsible for developing its service-wide doctrine, like the Army's Training and Doctrine Command (TRADOC). Nevertheless, the Air Forces' Tactical Air Command (TAC) established a joint office with TRADOC; the Directorate of Air-Land Forces Application (ALFA). Between 1975 and 1979, ALFA served to resolve many tactical problems regarding air-ground operations, however, operational issues and higher level requirements for coordination between the Army and Air Force were not resolved.<sup>31</sup>

If the 1970s were typified by the growing commitment to more effective and integrated air-ground operations at the tactical level, the 1980s were the years of growing attention and emphasis on the operational level of war. The Army's awareness of the operational level of war was recognized doctrinally in the 1982 edition of *FM 100-5*, which emphasized its role in designing, planning and conducting campaigns to defeat an enemy through sustained operations using simultaneous and sequential battles.<sup>32</sup> Four basic tenets for military operations were included in the new capstone doctrine: initiative, depth, agility, and synchronization.<sup>33</sup> The new emphasis on operational war and the use of depth and simultaneous attacks built on the concept of AirLand Battle and emphasized the need to interdict enemy second echelon forces while the first echelon was being defeated in the close battle. The Army's doctrine reflected a growing capability to shape the tactical battlefield by using operational fires to disrupt, delay, defeat, or destroy selected enemy forces, formations, and functions at operational depths. The requirement for greater synchronization and dependence on the Air Force to help accomplish deep

attack at both the tactical and operational level was evident, and appropriately the Air Force was very involved in the development of the Army's AirLand Battle doctrine.

Supporting the AirLand Battle doctrine was a new category of air support called battlefield air interdiction (BAI) which served to facilitate deep attacks beyond the close fight, but short of the depth where the Air Force traditionally assumed responsibility for deep attack using AI. BAI served the ground force commander by attacking enemy forces "in a position to directly affect friendly forces," deeper than the close fight supported by CAS, but not at the depth at which the Air Force employed AI.<sup>34</sup> BAI was typically used to target enemy forces and formations out to, and often a bit beyond the FSCL. BAI gave the Army commander the control needed to plan and employ Air Force assets beyond the close fight, against enemy forces that could affect his battle plans. BAI helped the commander effectively attack targets that fell into an increasingly gray area of overlap between tactical and operational levels.

The AirLand Battle doctrine, with its emphasis on the operational level of war, was updated in the 1988 edition of *FM 100-5* and expanded on the role of planning and conducting campaigns and major operations. Demonstrating a more joint perspective, the new doctrinal manual noted:

Operational level commanders try to set favorable terms for battle by synchronized ground, air, and sea maneuver and by striking the enemy throughout the theater of operations. Large scale ground maneuver will always require protection from enemy air forces and sometimes naval forces. Commanders will therefore conduct reconnaissance, interdiction, air defense, and special operations almost continuously. Air interdiction, air and ground reconnaissance...must be all be synchronized to support the overall campaign and its supporting operations on the ground, especially at critical junctures.<sup>35</sup>

Dr. Harold R. Winton, a professor of military history and theory, wrote recently that the above mentioned reference, "reflected a growing maturity on the part of Army doctrine writers, for it specifically referred to ground operations supporting an overall campaign plan."<sup>36</sup> He went on to note that, "this doctrinal statement implicitly accepted the proposition that the critical decisions on how the synchronization would take place would be in the context of campaign objectives, not merely the tactical dictates of individual battles."<sup>37</sup> Although the Army's developing doctrine demonstrated a more "mature" and "joint" perspective, it is fair to believe that the Army still viewed deep attacks and operational fires in terms of its ultimate effect on land operations. Moreover, the Army was becoming less willing to accept a clear divide between close and deep battle and the related forfeiting of the deep battle to the Air Force.

With a growing awareness of the importance of deep attack, and the technological potential to target the enemy at greater depths, the Army began developing and fielding new systems which gave the ground forces an organic deep attack capability. The introduction of the multiple-launch rocket system (MLRS), Apache attack helicopter, and later the Army Tactical Missile System (ATACMS) meant the Army was no longer dependent on the Air Force alone to conduct deep attack against enemy forces 30 to over 100 kilometers beyond the front line of troops.

The Army's growing interest and capability to plan and execute operational fires led to renewed concern for defining roles and responsibilities for the deep fight and coordinating air and ground operations. The search for a clear resolution between Army and Air Force responsibilities and coordination for deep fires increasingly focused on the



fire support coordination line (FSCL).<sup>38</sup> From its inception, through the 1970s, and into the 1980s, the FSCL has continued to effectively serve “as the dividing line between Army and Air Force control of the battlefield.”<sup>39</sup> The development of a much more substantial deep attack capability by the Army, combined with greater doctrinal emphasis on the role of operational fires and deep and simultaneous attack, has led to a reassessment of the FSCL.

With the advent of the multiple-launch rocket system and later ATACMS, Army had weapons that could reach out to roughly 30-100 kilometers respectively. Additionally, the corps deep attack manual envisioned Apache helicopter attacks to a depth of 70-100 kilometers beyond the front lines. These newly developed capabilities placed the Army and the Air Force at loggerheads. If, on the one hand, the FSCL was pushed out to the depths of new Army weapons, it would significantly interfere with Air Force interdiction efforts and could potentially allow enemy forces to escape attack by friendly air formations. If, on the other hand, the FSCL was kept relatively close to the friendly front lines, the corps commander would lose freedom of action in the employment of his fire support assets if he was required to coordinate fires beyond the FSCL with the Air Force prior to execution. This conundrum defied mutually satisfactory resolution.<sup>40</sup>

The placement of the FSCL and the conflicting perspectives of the Army and Air Force is really just a part of a larger issue: Who should be responsible for the planning, coordination, and direction of deep fires? The Air Force, with the traditional deep attack mission and the majority of suitable assets, considers the JFACC as the appropriate coordinator of operations beyond FSCLs, while the Army insists that the LCC should have the authority to plan and synchronize fires in throughout the depth of his area of operations.<sup>41</sup>

Meanwhile, the Air Force began to place greater emphasis on its unique role in operational and strategic attacks, leading to further disagreements over roles,

responsibilities, and control over the deep battle.<sup>42</sup> The Air Force's newly developing perspective on the role and potential of airpower was evident in the 1988 publication of *The Air Campaign: Planning for Combat*, written by Colonel John A. Warden. Since publication, Colonel Warden's book has been largely accepted as the definitive reference on modern airpower theory. In it he emphasizes that, "air superiority is crucial, that in many circumstances it alone can win a war, and that its possession is needed before other actions on the ground or in the air can be undertaken."<sup>43</sup>

Colonel Warden's development, and the Air Force's acceptance, of five concentric rings, as a targeting model of the enemy system to help establish priorities for air campaigns further highlights the growing differences in perspective between the Army and Air Force. The five rings model identifies the enemy's fielded military forces as the least critical target set for targeting and attack by airpower.<sup>44</sup> Naturally, this perspective is not enthusiastically endorsed by Army leaders who still maintain that victory in war is seldom achieved until the enemy's forces are decisively engaged and defeated. The differences in position between the Army and the Air Force is further evident in an examination of their doctrine.

## CHAPTER 3 DOCTRINAL REVIEW

A review of Army, Air Force, and Joint doctrine provides insight into how each views war and conducts operations independently and as part of a joint force. Comparing doctrine, one gains an appreciation of the different perspectives of each of the services as well as an understanding of how the services work together as a joint team. The mutually shared interests and interdependence in deep attack by each of the services has made the subject of operational fires and interdiction a critical joint issue. This chapter will highlight some of the basic service doctrine related to deep attack and operational fires/interdiction, review related joint doctrine, and then summarize with an analysis comparing each perspective.

### ARMY DOCTRINE

Doctrine is the statement of how America's Army, as part of a joint team, intends to conduct war and operations other than war.

*FM 100-5, Operations*<sup>45</sup>

As noted in the opening sentence of the Army's keystone doctrinal publication, the Army recognizes itself as part of a joint team. Without any intent to degrade the vital roles played by the other services, the Army views itself as "the nation's historically proven decisive military force."<sup>46</sup> The basis for this statement is the Army's unique role in conducting sustained land combat operations at all levels of war. Army doctrine goes on to state:

US Army doctrine is compatible with joint doctrine. It recognizes that a joint force commander (JFC) has a variety of ground, sea, air, special operations, and space options available to accomplish strategic objectives. Nonetheless, **actions by ground force units, in coordination**

with members of the joint team, will be **the decisive means to the strategic ends.**<sup>47</sup> [emphasis added]

The Army's perspective on war is based on the historically proven requirement for sustainable ground forces to defeat the enemy's war fighting ability through the successful conduct of campaigns or major operations. It is natural then, that the Army tends to view war from a tactical perspective, leading to operational and strategic success. Nevertheless, with the development of technology, the Army has accepted and even advocated the importance of deep operations in addition to close, tactical engagements and battles.

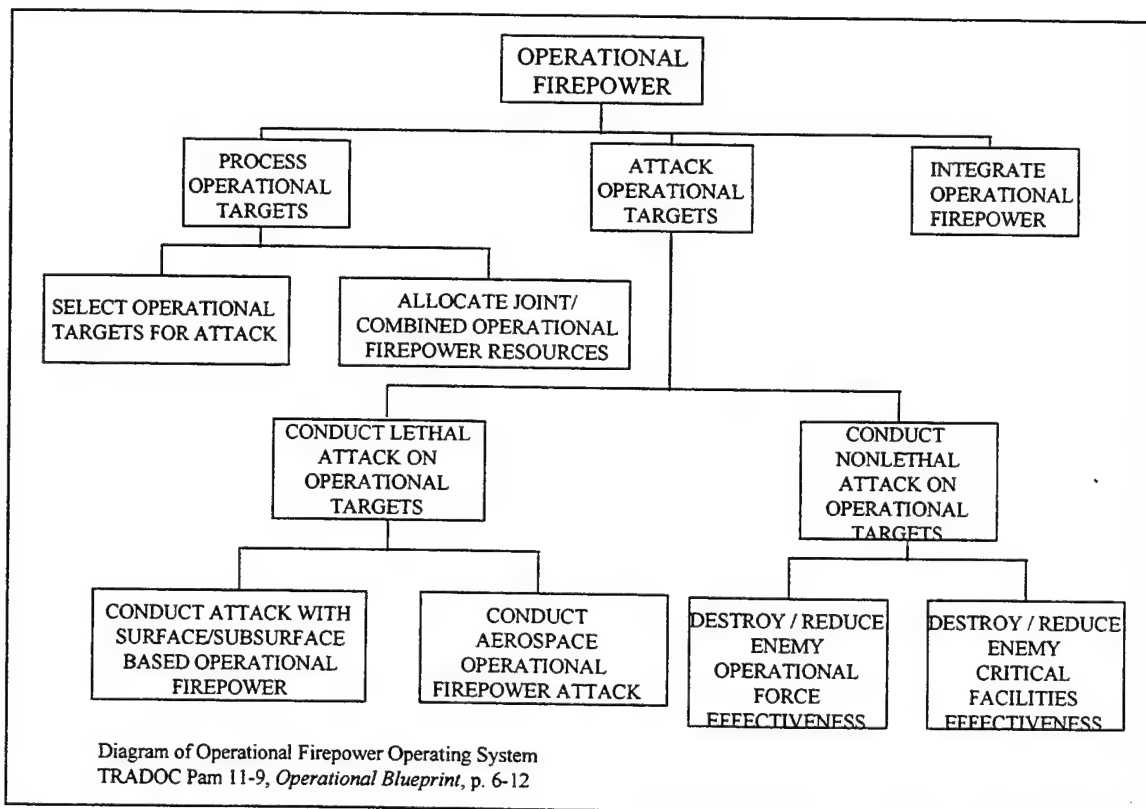
Army doctrine recognizes the importance of coordinating and synchronizing deep and close battles so that they are complimentary in nature.<sup>48</sup> Fires, or firepower, has been traditionally the primary means of conducting deep attacks, whether at the tactical, operational, or strategic levels. Fires, whether surface or air delivered, are the primary means of interdiction. Army doctrine notes:

Interdiction is a means to direct combat power simultaneously throughout the depth of enemy forces and hasten enemy loss of initiative and ultimate destruction. Effective interdiction occurs when it is synchronized with maneuver to support the concept of operation of a single commander. All forces--ground, air, maritime, and special operations--are capable of interdiction. When their operations are integrated and synchronized with maneuver, they present the greatest dilemma to the enemy. The enemy cannot move against his objectives without absorbing losses or eroding resources, nor can he synchronize his combat power.<sup>49</sup>

Several important features of the Army's perspective on deep attack are emphasized in the statement above: simultaneous attack in depth; synchronization with maneuver; a single commander's concept of operation; and the integration of interdiction fires with other services. To support these concepts in army organizations, brigade

through corps, a fire support coordinator with a supporting organization (fire support element) is used.

With the advancements in technology that has enabled greater targeting and engagement of enemy forces throughout the depth of the battlespace, the Army has placed greater attention on tactical and operational deep attack. The concept of deep and simultaneous attack has become a doctrinal cornerstone for both current and future Army operations as part of a joint team.<sup>50</sup> Two organizations used by the Army to help plan, synchronize, and coordinate these deep attack operations are the Deep Operations Coordination Cell (DOCC) and the Battlefield Coordination Element (BCE). These organizations play a vital role in making the operational firepower operating system function (see the diagram below).



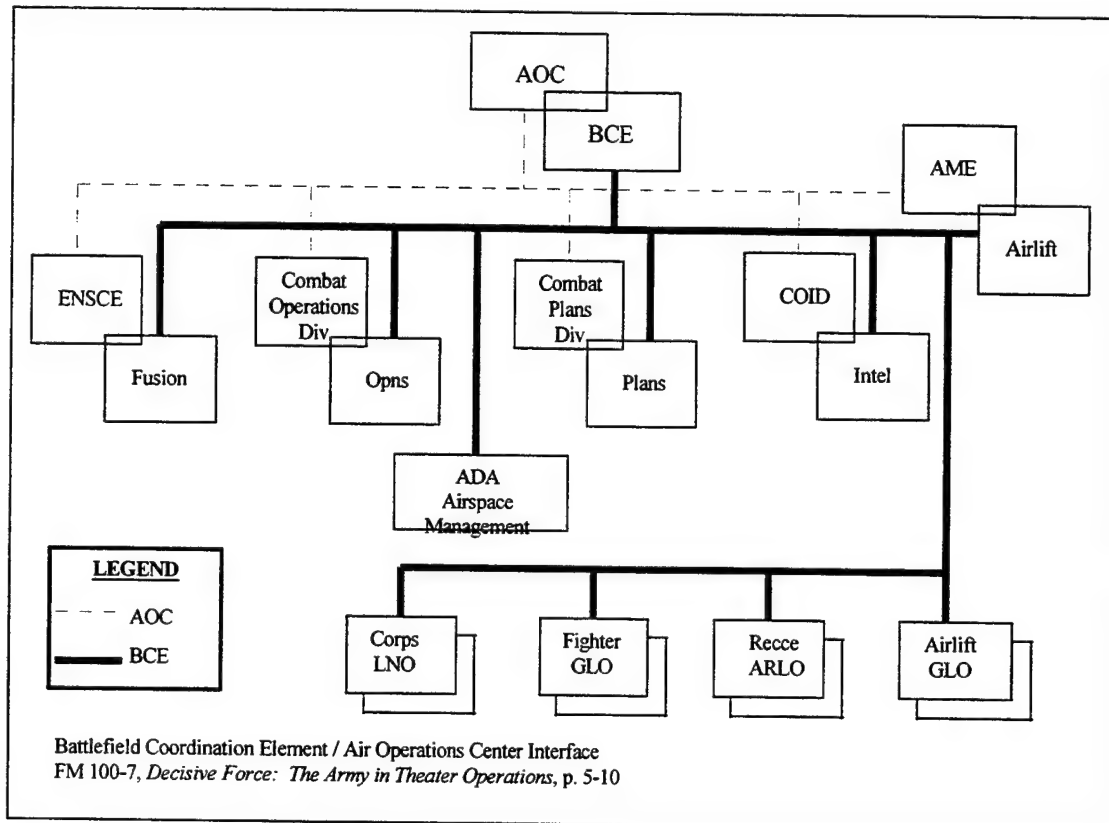
The Deep Operations Coordination Cells (DOCC), found at corps and Army Forces (ARFOR) headquarters, serve as an operational level fire support element for centralized command and control of deep attack operations.<sup>51</sup> (It is also becoming increasingly common for divisions to create DOCCs to plan, coordinate, and direct deep tactical operations.) The DOCC is organized with appropriate representatives of the various services and multinational/coalition forces and has as its primary functions “situational awareness, planning and coordination, targeting, and control of designated operational firepower.”<sup>52</sup> DOCC operations are directed by a general officer, such as the deputy commander, chief of staff, or corps artillery commander, who serves as the force commander’s deep fires coordinator. Through the DOCC, he “ensures effective and efficient employment of critical assets and facilitates synchronization of joint operations.”<sup>53</sup>

While the DOCC operates as an internal element of an army command post, it coordinates operational fires and interdiction requirements to external organizations and liaison officers.

The Army DOCC effects coordination with the US Air Force through the BCE located at the Air Force AOC, the ground liaison officers at the wings, and the Army liaison officer aboard the airborne command and control center (ABCCC). Similar functions are performed within the Navy Tactical Air Control System (NTACS) by its tactical air control center. These assets receive information from and provide feedback directly to the DOCC.<sup>54</sup>

Under current Army doctrine, supported by Air Force and Joint doctrine, the Battlefield Coordination Element (BCE) is the primary coordinating agency between the Army Component Commander’s headquarters and the Joint Force Air Component Commander’s Air Operation Center (AOC).<sup>55</sup> As shown in the diagram below, the BCE

is organized to “facilitate synchronization of air operations with ground operations through coordination of air support and the exchange of operations and intelligence data.”<sup>56</sup>



While the DOCC plans, coordinates, and directs operational fires as part of corps and echelon above corps deep operations, the BCE serves to synchronize requested support from the Air Force and “expedites the exchange of information through face-to-face coordination with elements of the AOC.”<sup>57</sup> While the BCE is collocated with the AOC, it serves the ASCC/ARFOR commander and represents the air support requirements of subordinate land units.<sup>58</sup>

## AIR FORCE DOCTRINE

Air and space doctrine is a statement of officially sanctioned beliefs and warfighting principles that describe and guide the proper use of air and space forces in military operations.

AFDD 1, *Air Force Basic Doctrine*<sup>59</sup>

With advancements in technology, the Air Force has played an increasingly important role in fighting, or being prepared to fight, the nation's mid- to high-intensity wars. The Air Force contributes to the war effort in four ways. First, through offensive and defensive counterair operations the Air Force seeks to gain air superiority, if not air supremacy. Second, the Air Force provides force application through strategic attack, air interdiction, and close air support. Third, force enhancement is provided in the form of airlift, aerial refueling, surveillance and reconnaissance, and other means. Finally, the Air Force provides force support to sustain aerospace operations.<sup>60</sup>

Doctrine understandably advocates the winning of air and space superiority as the first priority of the Air Force.<sup>61</sup> This not only promotes joint force protection from enemy air attack, but it also greatly increases the flexibility and freedom of friendly aircraft to conduct strikes against strategic, operational, and tactical targets.

Air Force doctrine notes, "unlike surface forces, modern air and space forces do not normally need to sequentially achieve tactical objectives first before pursuing operational or strategic objectives."<sup>62</sup> In fact, while the Air Force is capable of attacking targets at all three levels of war, its focus is usually at the theater or strategic level. This focus naturally developed from airpower's historical role as the sole force regularly capable of striking deep, and airpower advocates' belief that war's can be won more quickly and less costly by focusing combat power at the strategic rather than tactical



level. Air power supporting tactical operations or employed as operational fires to shape the battlefield for ground forces may frequently be viewed as a diversion of vital and limited resources that is unjustified based on “an airman’s expert understanding” of the “broad strategic and/or theater perspective.”<sup>63</sup> As noted in *Air Force Basic Doctrine*:

Realizing that for many situations, air and space operations provide the most efficient and effective means to attain national objectives, **commanders must persist in air and space operations and resist pressures to divert resources to other efforts unless such diversions are vital to attaining theater goals or to survival of an element of the joint force.** [emphasis in the original text]<sup>64</sup>

Air Force doctrine emphasizes the unique characteristics of air and space power as emphasized in the seven tenets of airpower. These tenets include: centralized control/decentralized execution; flexibility and versatility; synergistic effects; persistence; concentration; priority; and balance.<sup>65</sup> The *Air Force Basic Doctrine*, notes, “the seemingly conflicting demands of the principles (of war) and tenets, especially the demands of mass, economy of force, concentration, and priority, **require an airman’s expert understanding** in order to strike the required balance” [emphasis in the original text].<sup>66</sup> To find the right “balance” and best apply their tenets of airpower, the Air Force closely manages and controls their limited assets through the Air Operations Center.

One of the contentious effects of Air Force doctrine and the application of their tenets is the fact that major ground force commanders can do little more than **request** air interdiction as part of the operational fires he feels are needed to shape the battlefield to contribute to tactical and operational success.<sup>67</sup> As will be noted later, this led to some of the friction between the Army and Air Force during the Gulf War.

While the Army focuses on the tactical and operational levels of war, the Air Force tends to focus at the theater and strategic levels. The *Air Force Basic Doctrine* emphasizes that, "air and space power must be controlled by an airman who maintains a broad strategic and/or theater perspective in prioritizing the use of limited air and space assets to attain the objectives of all US forces in and contingency across the range of operations."<sup>68</sup> The Air Force does not disregard their role in providing close air support or interdiction to help shape the battlefield for ground forces, they simply give it a lower priority; in most cases out of their doctrinal belief that air assets are best concentrated and focused on gaining air superiority and then attacking strategic and then operational targets.

## JOINT DOCTRINE

Joint doctrine is a critical ingredient for success because the way in which leaders think and organize their forces will be as important as the technology we use to conduct future joint operations. Future joint doctrine must articulate the process required for successful joint planning but must be flexible enough to serve as a broad framework to guide forces in joint and multinational operations. It is the key to enhanced jointness because it transforms technology, new ideas, and operational concepts into joint capabilities.<sup>69</sup>

As noted above, joint doctrine has a critical role to play in ensuring that each of the services in the United States' Armed Forces can effectively fight as part of a joint team. How the military is organized, trained, and equipped is largely dependent on a common understanding of how America will fight its wars. The roles and responsibilities of each of the services and joint staffs and commanders must be clear. The process to be used for planning and executing joint and combined operations should be well defined

and practiced. Nevertheless, joint doctrine for deep attack and the use of operational fires is lacking.

Three joint doctrinal manuals are of particular interest regarding operational fires: Joint Pub 3-0, *Doctrine for Joint Operations*, Joint Pub 3-03, *Doctrine for Joint Interdiction Operations*, and Joint Pub 3-09, *Doctrine for Joint Fire Support*. While Joint Pubs 3-0 and 3-03 have been published, ongoing disagreements with the Air Force has delayed the publication of Joint Pub 3-09 for several years. Originally directed for publication in 1988, it was to establish “doctrine and procedures for planning and execution of all fires to include common fire support coordination measures, linkages with intelligence, and allocation of fire support efforts to ensure that all forces are coordinated in their efforts to support the Joint Force Commander’s battle plan.”<sup>70</sup> Concerns by the Air Force on roles and responsibilities; disagreement with the concept of fires; and disagreement on the need for a joint force fires coordinator (JFFC) prevented earlier publication of Joint Pub 3-09. The Air Force felt coordination responsibilities for fires and interdiction were inappropriate at the JFC level and thus the JFFC was not needed.<sup>71</sup>

Despite shortcomings and problems in developing joint doctrine, it does clearly define overall responsibilities for joint, operational firepower and interdiction. Joint Doctrine clearly notes the Joint Force Commander is responsible for the employment of joint fires/interdiction to accomplish four general tasks:

1. Facilitating maneuver to operational depth,
2. Isolating the battlefield by the interdiction of uncommitted enemy forces,
3. Disrupting or destroying critical functions and facilities that have operational significance, and,

4. Protecting portions of the area of operations when economy of force is necessary.<sup>72</sup>

Joint doctrine defines interdiction as “an action to divert, disrupt, delay, or destroy the enemy’s surface military potential before it can be used effectively against friendly forces.”<sup>73</sup> Interdiction has traditionally been the sole domain of the Air Force, since they had almost all the assets that could conduct interdiction, especially at operational depths. Although the Air Force may still have the largest percentage of assets capable of conducting interdiction, the other services are quickly increasing their ability to employ and exploit operational fires and interdiction. Furthermore, some systems, like ATACMS and extended-range MLRS, can provide lethal fires with great accuracy in a matter of minutes against high payoff, fleeting targets, which the Air Force simply could not respond to in time.<sup>74</sup>

Joint doctrine recognizes that air, naval, land, and special operations forces each are capable of conducting interdiction operations with their organic assets to “support the JFC’s operation or campaign objectives, or support other components of the joint force, to benefit the joint force as a whole.”<sup>75</sup> Although each of the services can contribute operational fires to interdict the enemy at operational depths, interdiction assets are limited and of considerable value. For this reason, joint doctrine notes, “since there will rarely be enough joint interdiction assets to meet all demands, the JFC should arrange for the **centralized direction** of these assets to ensure the unity of effort required for their optimum use.”<sup>76</sup> [emphasis added.]

Joint doctrine emphasizes the importance of synchronizing the actions of each component’s forces and integrating their “unique and complementary capabilities” to

project joint synergy simultaneously throughout the depth of the battlespace.<sup>77</sup> The joint force commander has several means of attempting to best synchronize, integrate, and coordinate the joint forces. Joint doctrine notes “the JFC structures the joint force to ensure that diverse component capabilities, operations, and forces complement each other to achieve the desired results effectively and efficiently.”<sup>78</sup> In addition to force structuring, the JFC uses defined areas of operation, command and support relationships, and allocation of resources to influence the joint forces ability to effectively conduct major operations and campaigns. Recognizing the importance of joint interdiction and operational fires, special attention is paid to its synchronization:

The planning, coordination, and integration of joint interdiction with other operations (such as maneuver) can yield unique advantages. This synchronization of effort begins with the JFC’s theater- and/or JOA-wide perspectives and objectives. Subsequently, the JFC’s theater and/or JOA campaign or operation plan facilitates such synchronization and helps ensure that interdiction operations are part of a larger design aimed at achieving the JFC’s objectives.<sup>79</sup>

Understanding the JFC’s intent for interdiction operations as part of the larger campaign/operation plan, specific requirements for interdiction and operational fires are managed through the apportionment of air assets and with the possible assistance of a joint targeting coordination board (JTCCB). The JFC makes the air apportionment decision, determining how much air effort will be allocated for different purposes (such as counterair, strategic attack, interdiction, and close air support). These apportionment decisions are made based on the request of component commanders and the JFC’s concept of operations to weight the air effort in accordance with campaign objectives. Once air apportionment is done, “the JFACC allocates the apportioned air sorties to the functions, areas, and/or missions they support.”<sup>80</sup>

The JFC may establish a JTCB to help ensure the efficiency and effectiveness of the joint targeting process, particularly at the operational and strategic levels. The JTCB typically, "reviews target information, develops targeting guidance and priorities, and may prepare and refine joint target lists."<sup>81</sup> The joint target list (JTL) promotes the effective and efficient use of collection and attack assets by identifying targets to be engaged by type, time, and desired effect.<sup>82</sup> The JTCB is not a full time organization and does not have the resources, personnel, or expertise to plan, coordinate, synchronize and direct operational fires and interdiction. These responsibilities the JFC normally delegates.<sup>83</sup>

### **SUMMARY OF DOCTRINAL REVIEW**

Since doctrine is largely derived from previous experiences and lessons in war it is not unusual that the Army would be oriented on the tactical battle and view strategic success as the result of tactical and operational victories. Likewise, it is not unusual that the Air Force tends to view war from a more strategic perspective. The services have different environmental perspectives on war. These differences were not too significant in the past, when the battlefield could more easily be divided between the close Army fight, and the deep Air Force fight. Coordination was still required to maximize the effects of operational fires and interdiction, as was evident in Italy and Normandy during the Second World War. Nevertheless, the Army lacked any significant organic means of providing operational fires and usually lacked the means to quickly exploit their effects. As the tactical and operational levels of war have become somewhat overlapped and the Army has gained a significant ability to fire and maneuver at operational depths, simply

drawing a line of responsibility between the ground and air functional components seems like a poor solution.

Joint doctrine clearly recognizes the need to synchronize and coordinate fires and interdiction at the operational level. It also provides some means of facilitating this. The individual services also have incorporated organizationally and in doctrine the means of synchronizing and coordinating deep attacks. However, current doctrine does not resolve the competing perspectives and interests of the services.

Joint doctrine notes that interdiction typically focuses on operational level objectives. These operational fires may be focused on enhancing strategic level objectives with theater wide effect, or they may focus on enhancing "tactical level objectives which more directly complement maneuver forces."<sup>84</sup> The Air Force doctrine clearly promotes a strategic-theater level focus in the belief that the effects are more significant and lead to a faster resolution of the conflict. Army doctrine contends that operational firepower is best "integrated with operational land maneuver for synergistic effect, staying power, and more rapid achievement of strategic aims."<sup>85</sup> While the Air Force clearly has the lead in very deep operational and strategic attacks, the Army or Marines have the lead in tactical operations. The problem which doctrine does not solve is how to best ensure operational fires are employed effectively and efficiently to meet the JFC's intent in the "gray area" created where tactical and operational actions tend to overlap. This gray area generally starts around the FSCL and extends to the ground component commander's AO boundary. Here, the conflicting operational interests, functional perspectives, and priorities between component commanders and their relative

focus on tactical actions by the land commander and strategic actions by the air commander is the overlap.<sup>86</sup>

The Air Force perspective is that the JFACC is best suited for providing the centralized direction of interdiction assets for the JFC. They maintain that the Army commander's operational requirements will be met through the JFC's apportionment decision, joint coordination through FSEs, DOCCs, and the BCE; and the use of air liaison officers.<sup>87</sup>

The Army perspective emphasizes joint doctrines affirmation that within a component commander's area of operation, they are responsible for synchronizing maneuver, fires and interdiction.<sup>88</sup> The Army also agrees with joint doctrine's recognition that, "synchronizing interdiction and maneuver and their joint fires enhances the ability for each to more fully contribute to a successful outcome of a campaign or major operation."<sup>89</sup> The Army clearly contends that it is most capable of integrating and synchronizing maneuver with fires and interdiction in support of both tactical and operational goals; therefore, they should be able to control or direct operational fires to the limits of their area of operations.

The result of current doctrine is the JFACC plans and directs interdiction theater wide and is the supported commander for interdiction, except within the area of operations that the JFC has given to the land and naval commanders. The ground commander has responsibility for synchronizing and integrating maneuver and fires (to include interdiction), yet he can only request air support for operational fires that shape the battlefield for his forces. Although the JFC apportions air resources and gives



guidance on his intent for interdiction, the use of operational fires/interdiction by the JFACC and the ground component commander reflects their interpretation of the JFC's intent. These interpretations are naturally colored by their ground and air focused perspectives on war. The question remains, "How can the JFC best synchronize interdiction and maneuver, maximizing the potential of operational fires to achieve his intent?"

When considering an answer to this question, all the services and the joint doctrine can agree on three criteria; the need for maximum efficiency, effectiveness, and unity of effort. Efficiency acknowledges the limited and vital nature of operational fires' assets, to include aircraft available for interdiction sorties, and seeks to maximize their availability. Also related to efficiency is the speed and simplicity of the process/organization for targeting, planning, and coordination of operational fires. Effectiveness is measured in terms of achieving desired effects on the enemy's forces, functions, or facilities at the right time and place. Obviously related to effectiveness is the responsiveness of the targeting process, especially when operational fires are directed against a fleeting target. Unity of effort involves cooperation and coordination among different forces and components to achieve a common, ultimate objective (the JFC's intent). While service and joint doctrine currently seeks to be effective, efficient, and maintain unity of effort, the diffused responsibilities, focus, and perceptions of the components appears to prevent the best use of operational fires. A short review of the experiences during the recent Persian Gulf War may serve to better demonstrate this.

## **CHAPTER 4**

### **HISTORICAL REVIEW**

Since operational fires are largely, maybe even predominantly, dependent upon technology, it is appropriate when considering the future of operational fires that lessons be learned from recent historical experiences. The Persian Gulf War serves well as a recent conflict using modern technologies and doctrine in a sizable conventional conflict. Although unique in many respects, several lessons can be learned by studying the use of operational fires during Operation Desert Storm.

#### **THE GULF WAR**

Although there is some discussion about the overall political/strategic success of the American led coalition against Iraq, there can be no doubt that at the tactical and operational levels, Operation Desert Storm was an overwhelming military victory. Two other facts can also be accepted. The use of coalition airpower, led by the U.S. Air Force, played a major role in the war and contributed significantly to the quick and decisive victory accomplished with so few friendly casualties. A second fact also can't be denied. Despite complete air superiority and the massing of the largest and most technologically advanced air forces in history, the month long "air campaign" did not win the war; it was the American led coalition ground forces that defeated the Iraqi army and freed Kuwait.

In the greater scheme of things, the successful use of operational fires and air interdiction to shape the battlefield can't be denied; however, despite its success, operational fires were not "maximized" in terms of their efficient and effective use. Several factors prevented operational fires from making the greatest contribution

possible. These include the lack of established procedures and organizations for planning and executing operational fires and joint interdiction, the sudden elimination of Battlefield Air Interdiction by the Air Force, and conflict over the Fire Support Coordination Line.

Targeting for the air campaign began in the isolation of an Air Staff planning cell called Checkmate. With almost no joint interaction, Colonel John Warden supervised the Air Force targeting team in developing a plan of attack which focused air efforts on air superiority and strategic attack. The plan focused on the destruction or isolation of the Iraqi leadership, the attack of enemy production facilities and infrastructure, but gave little attention to targeting enemy forces and shaping the battlefield for the ground component of the joint forces.<sup>90</sup>

The Air Force perspective on war and the lack of joint planning continued when Lieutenant General Charles A. Horner, Commander of Central Command's Air Force Component (CENTAF) created a non-doctrinal planning group under Brigadier General Buster Glosson known as the Black Hole. The Black Hole not only circumvented planning, coordination and targeting input from other services by taking over many of the doctrinal functions of a Joint Target Coordination Board, it even circumvented many of the functions of the Air Forces' Tactical Air Control Center.<sup>91</sup>

The Air Force's apparent autonomy in operational and strategic targeting, combined with the failure to establish an effective JTCB early added to the apprehension felt by the various services and certainly degraded the coordination and planning synchronization between the components. As noted by Richard M. Swain in his book

"*Lucky War*" *Third Army in Desert Storm*, General Schwarzkopf was not able to "exercise close executive supervision over forces in the field" which further justified the earlier establishment of a joint targeting board "to assist the CINC in coordinating air and ground offensives."<sup>92</sup> Many of the Army leaders felt the Air Force was effectively trying to fight its own war and gave little attention to the requirements of the ground forces in shaping the battlefield with operational fires. The lack of joint representation and involvement in targeting added to this perception.

General Horner's staff was built around his Ninth Air Force staff. When it was expanded, to include Glosson's planners, to serve as CENTAF and the supporting staff for the Joint Forces Air Component Commander, it continued to be manned almost entirely by Air Force personnel. As noted in the *Gulf War Air Power Summary Report*, "this fact would shape the way Horner exercised his authority as JFACC and cause some lingering suspicion among the other Services."<sup>93</sup> Even after a JTCB was eventually established (under the JFACC) ground commander were still concerned that their interdiction nominations were not receiving adequate attention.<sup>94</sup> The ARCENT Operations Officer, Brigadier General Arnold, reported during the war:

Air support-related issues continue to plague final preparations for offensive operations and raise questions concerning our ability to effectively shape the battlefield prior to initiation of the ground campaign...Army nominated targets are not being serviced. Efforts must be taken now to align the objectives of the air and ground campaigns and ensure the success of our future operations.<sup>95</sup>

The potential importance of the JTCB, and to a lesser degree the BCE, was made even more significant to the Army and Marine Corps by General Horner's decision to eliminate BAI as a separate category of airpower targeting for the sake of simplifying the

Air Forces' planning and employment procedures.<sup>96</sup> While the elimination of BAI made sense to the Air Force and was supported by their tenet of centralized control, it was a great shock to the ground forces which accepted BAI as a doctrinal concept and an essential element for ground commanders to plan and direct interdiction at the tactical and operational level to attack critical targets, limit the enemy's freedom of maneuver, and support their sequence and concept of operations. The absence of BAI further reduced the ability of ground commanders to directly influence the shaping of their battlefields. As noted by BG Robert Scales in his book on the Gulf War, *Certain Victory*:

Since BAI was most essential to Generals Luck and Franks for shaping the battlefield for the coming ground operation, its availability was crucial, and they trusted that it would be available. To support their schemes of maneuver, the corps commanders wanted to be able to direct air attacks against the most important targets beyond the reach of their organic attack systems. The issue was not how much of the total air effort was devoted to shaping the battlefield; the Army recognized competing priorities such as air-to-air and air interdiction of deep theater targets. The issue was that corps commanders needed to control the effects and timing of BAI targeted within their zone. Placing BAI under an overall category of interdiction reduced the corps commander's influence on the process.<sup>97</sup>

The elimination of BAI and the apparent monopolization of the strategic and operational fires planning by the Air Force and the Dark Hole, created friction between the services and concerns by Army commanders that deep tactical and operational targets of interest would not be attacked in a timely and coordinated manner. These frustrations combined with a concern about the Air Forces ability to clear air space quickly enough for surface delivered tactical and operational fires led to problems with the placement of the Fire Support Coordination Line.

In an attempt to resolve some of the historic problems associated with planning and deconflicting operational fires, high level planners created more confusion by using non-doctrinal coordination measures such as the Reconnaissance and Interdiction Planning Line (RIPL), to separate strategic and operational interdiction targeting, and the Battlefield Coordination Line (BCL), to define areas for attack aviation.<sup>98</sup> Worse than the use of non-doctrinal control measures was the failure to properly use the FSCL, a well defined and well established doctrinal fire support coordination measure.

The FSCL is by Army and Joint doctrine a permissive measure designed to facilitate the timely engagement of targets. The Air Force effectively twisted the FSCL into a restrictive measure, requiring Army commanders to seek clearance from the Air Force before being able to fire beyond the line. The employment of operational fires by the ground commander's assets, most notably ATACMS and attack helicopters, became far less responsive as clearance became needed by the Air Force. Additional disagreements over the targets and priorities for deep attack contributed to problems with operational fires. An early example of this problem, which also demonstrates the growing complexity and variety of operational fires, involved the receipt of an ATACMS fire mission to destroy a key Iraqi surface-to-air missile site. Coordination of air space and clearance to fire took six hours.<sup>99</sup> On numerous other occasions deep attack of enemy targets were greatly delayed and often canceled due to problems clearing fires well beyond the FSCL.<sup>100</sup> This is clearly unacceptable to army commanders that are more frequently seeking to identify and engage fleeting targets compared to the more stationary or fixed targets more typical of air attack.

The effective result of competing perspectives and interpretations of the FSCL resulted in the line practically serving as a boundary between the JFACC and ground commanders. At one point, VII Corps was unable to launch a deep attack against the Republican Guard forces beyond the FSCL because the JFACC would not authorize the operation nor clear planned fires in that area.<sup>101</sup> To overcome the restrictive effects of the FSCL and ensure the ability to employ army assets more quickly and with greater freedom, VII Corps eventually pushed the FSCL so far forward that the Corps lacked the resources to monitor and target the whole area. As a result, some Iraqi units were able to escape and avoid being destroyed by either Army deep attack assets or the Air Force.

The FSCL became so contentious because the Army and the Air Force each felt it was best suited to control and coordinate activities immediately beyond the line. In an article written by the Army and Air Force Chiefs of Staff, Generals Reimer and Fogleman noted that the experiences in Desert Storm demonstrated the, "apparent friction over which component commanders should plan and control deep operations beyond the fire support coordination lines (FSCLs)."<sup>102</sup> As they noted, "the Air Force considered JFACCs best suited to coordinate operations beyond FSCLs, while the Army thought LCCs should plan and synchronize fires in the entire land AO."<sup>103</sup>

## **CONCLUSIONS FROM THE GULF WAR**

Air planners have long sought to vindicate the view that the ever-increasing accuracy of air-delivered munitions has made it possible to win wars the "clean" way--through strategic targeting. In this view, the application of air power then becomes a campaign--if not a separate war--distinct from ground combat. The Army, on the other hand, does not recognize the distinction. Instead, ground commanders see air power as the means to weaken the enemy and shape the battlefield. Desert Storm once again surfaced this fundamental difference."<sup>104</sup>

The Gulf War strained inter-service relations between the Army and the Air Force as both doctrinal differences and competing perspectives on optimal means to conduct major operations and campaigns became evident.<sup>105</sup> Certainly these differences and the friction that resulted did not contribute to efficiency or maximize unity of effort. The lack of a centralized, joint approach to designing the campaign plan, specifically with regards to operational fires and targeting, has led some authorities to note that CENTCOM's "military strategy was more joint in name than it was in fact."<sup>106</sup> Without the equivalent of a Joint Force Fires Coordinator working directly for the CINC, the JFACC assumed overall responsibility for operational and strategic fires, to include even eventually establishing the JTCB. The BCE chief, Colonel David Schulte, who attempted to represent the ARCENT's interests regarding operational and strategic targeting felt like "one of several competing voices at the daily targeting meetings," and he was not in a position to know the guidance Schwarzkopf gave to Horner.<sup>107</sup> With continuing disagreements of targeting priorities and the use of operational fires to shape the battlefield for ground operations, Lieutenant General Waller, the Deputy CINC, convinced Schwarzkopf to place the JTCB under him at ARCENT.<sup>108</sup>

The successful use of operational fires and the U.S. Air Force led interdiction efforts during Desert Storm is clear. Nevertheless, as one researcher noted, "the integration of the operational fire systems of the various components into the overall campaign design was disjointed."<sup>109</sup> The failure to more effectively and efficiently plan, target and apply operational fires resulted from the combination of poorly developed joint doctrine, a lack of joint staff involvement, and competing interests and perspectives by



the components instead of the unity of effort joint operations ideally would possess.

These failures led LTC William Welch, the Senior Plans Officer for the BCE to complain after the Gulf War:

a system of joint targeting that uses all available combat power needs to be developed--regardless of the component to execute the interdiction campaign. The traditional way of begging the Air Force for assets causes more problems than it solves."<sup>110</sup>

While the Air Force points with pride to the effectiveness of their air interdiction operations and its contribution to shaping the battlefield, the question must be asked, "how much different would the outcome have been if the Iraqi's had proven to be a competent, aggressive, and dynamic enemy rather than the passive and cooperative foe they proved to be?" The process of selecting targets, allocating resources, and coordinating fires is much more difficult when the enemy poses a more active defense or aggressive offense. These challenges would be greater still if the battlespace were not as open and bare as the deserts of Southwest Asia. Given the unique characteristics of the Gulf War that greatly supported the successful use of operational fires, shortcomings in the effective and efficient use of these fires should be given special attention.<sup>111</sup>

## CHAPTER 5

### FINDINGS & CONCLUSIONS

The nature of modern warfare demands that we fight as a team... The resulting team provides joint force commanders the ability to apply overwhelming force from different dimensions and directions to shock, disrupt, and defeat opponents. Effectively integrated joint forces expose no weak points or seams to enemy action, while they rapidly and efficiently find and attack enemy weak points. Joint warfare is essential to victory.

Joint Pub 1<sup>112</sup>

The quote above notes the essential need for joint operations to be effectively integrated, efficiently striking the enemy with a unity of effort focused on the joint force commander's intent. As noted in the beginning of this paper, new and expanding technologies is greatly enhancing the capabilities of each of the services to employ and exploit operational fires. These growing capabilities combined with the much smaller, projection force that the U. S. has adopted requires that operational fires be applied as effectively and efficiently as possible, not just by individual services accomplishing their operational objectives, but as a joint force. The earlier review of the development of operational fires, joint and service doctrine, and the experiences of the Gulf War indicate that while American capabilities are growing significantly, the U.S. Armed Forces tend to apply operational firepower as a multi-service force more than as a joint force.

The lack of a clearly defined, comprehensive joint doctrine regarding deep attack has clearly contributed to the continued problems with maximizing the potential of operational fires.<sup>113</sup> Such a doctrine, that is understood and accepted by all the services is clearly needed. As noted in a recent *Joint Forces Quarterly* article:

Deep strike operations, a traditional domain of the Air Force, have evolved with the advent of long-range land-based and sea-based weapons. To maximize force effectiveness and synergy in the adjacent close battle, joint doctrine must

define deep strike responsibilities for command and control and mission execution.<sup>114</sup>

While joint doctrine clearly notes that the Joint Force Commander is responsible for employment of operational fires to achieve campaign objectives, "the effective integration and synchronization of multi-Service deep attack forces and weapon systems in a combat theater currently poses a significant challenge for the joint force commanders (JFCs)."<sup>115</sup> This challenge remains, in part, because of the lack of effective doctrine and established organizational and procedural methods for planning, integrating, and synchronizing the operational fires and interdiction assets of the various services with the requirements of the maneuver forces.

Many people would advocate that the services continue the antiquated process of simply drawing a line on the map to divide full responsibility and control of operations.<sup>116</sup> Although this provides a relatively simple solution that with advanced coordination effectively worked during the 1940's, this position ignores the very real overlap in interests, capabilities and requirements for engaging targets, especially between the FSCL and the forward boundary of the LCC's AO. Simply dividing the battlefield into parts and delineating responsibilities by the FSCL ignores the growing "overlap" between tactical and operational levels of war, the greater mobility and tempo of operations, the greater variety of sensors and weapons systems for targeting and engaging the enemy in depth, and the greater need for efficiency and effectiveness in fighting the enemy. This technique also fails to allow for the greater complexity of non-linear battlefields. Furthermore, the need for operational deep fires to be synchronized,

coordinated, and integrated with maneuver forces and other joint operations precludes the independent "ownership" of the deep battlefield by the air commander.

Could the Joint Target Coordination Board serve as the solution to maximizing the efficient and effective use of operational fires? Certainly the JTCB concept is a positive doctrinal effort towards resolving the complex and competing issues related to operational and strategic targeting, however, it is not the solution. The JTCB is a coordinating board with representatives from the joint staff and the component commanders that meets regularly, but has no staff and is not equipped to support the full time planning, direction, and coordination of operational fires. And while joint doctrine does require the JFC to maintain a trained staff, it does not require him to establish a JTCB nor a Joint Force Fires Coordinator. The likely result, as happened in the Gulf War, is that the responsibility is passed to the JFACC.

The use of the JFACC, and his predominantly Air Force staff, as the "defacto" Joint Force Fires Coordinator is not a good solution. The JFACC and his staff are not generally focused on issues related to the land forces and the current and future close battles. Operational fires may play a tremendous role in the conduct of maneuver forces, especially in terms of future battles. "In joint campaigns involving ground operations, deep attack operations can have a militarily significant impact on the operations of maneuver forces and, therefore, may have to be planned and coordinated differently than if ground operations were not being conducted."<sup>117</sup> Joint operations, by their very nature, require the coordination and integration of the forces, systems, and capabilities of the

various services. This coordination and integration, for best effect, must involve both similar and dissimilar but complementing forces and capabilities.

The individual responsible for planning, directing, and integrating the coordinated use of operational fires for the JFC should not be a component commander. He should work directly for the JFC and be supported by a full time, well trained, joint targeting and coordination cell that works in conjunction with the J3. This will best ensure unity of effort as well as the effective and efficient use of operational fires. As noted by a military researcher at the Naval War College:

The fires coordination capabilities, expertise, and orientation of the JFACC and JFLCC are rigidly based on their environmental focus. Functional organization may facilitate the operational integration of similar (air or land or sea) forces. Functional organization, however, does not facilitate the integration of functional components within a joint force. Functional componentcy should not be the basis for control of operational fires. Without the unifying influence of a coordinating agency at the joint force level, functional componentcy results in disunifying component competition.<sup>118</sup>

Certainly for the Gulf War, the process of using the JFACC and an ad hoc Air Force targeting group as the cornerstone for operational fires coordination and planning caused disunity, even within the AOC. More importantly, while the planners in the Black Hole and the JFACC himself was no doubt working diligently to do what they felt was right, they lacked the experience and perspective needed to appreciate the competing requirements of land force commanders. The experiences of COL Schulte and other officers working in the BCE indicate the disconnects between the Army, the JFACC's targeting and planning staff, and even the CINC.

Joint doctrine describes the goal and intent for joint operations, but it fails to provide sufficient structure and means for accomplishing its objectives. The *Doctrine for*

*Joint Operations* clearly notes, "Functional and Service components of the joint force conduct subordinate and supporting operations, **not independent campaigns**" [emphasis added]. And yet, the Gulf War was essentially an air campaign followed by the 100 hour ground campaign. Doctrine clearly notes the responsibility of the Joint Force Commanders to "synchronize the actions of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated, joint campaigns and major operations," with the goal of increasing the "total effectiveness of the joint force."<sup>119</sup> What doctrine still does not prescribe is the individual and supporting joint staff element to support the JFC with this responsibility as it relates to operational fires.

The synchronization and integration of operational fires should be done by a joint staff working under the direction of a dedicated JFFC working directly for the JFC. This will become even more evident in the near future as each of the services gain an increased ability to contribute and exploit operational fires as part of the joint team. If properly planned, coordinated, and integrated these weapon systems will "increase the combat power available for use against selected objectives, resulting in enhanced economy of force and a higher tempo of operations."<sup>120</sup> Some of these systems, like the Apache Longbow, Comanche, MLRS, and Crusader, with extended range and accuracy will be able to provide tactical fires and "play a more significant role in the delivery of operational fire."<sup>121</sup> This dual capability of army weapons systems will greatly increase the potential and responsiveness of operational fires, but it will also create new challenges in coordinating the use and priority of assets, preventing redundant targeting, deconflicting airspace, and clearing fires. These new capabilities also may increase the

chance of conflict between the component members of the joint team. This further justifies the need to coordinate operational fires at the JFC level by an objective, joint fires element with a dedicated Joint Force Fires Coordinator.

Clearly joint doctrine, as it relates to operational fires and interdiction needs to be further developed. Just as clearly, the historical role of the Air Force as the dominant participant in deep attack operations is changing. With the smaller military force available to fight and win the nation's wars, the increasing capability of operational fires must be employed as efficiently and as effectively as possible. Operational fires must be synchronized and integrated in accordance with the Joint Force Commander's campaign plan. They must be balanced in their application to help achieve strategic effects while creating the conditions for decisive and rapid use of maneuver forces.

Operational fires can best be maximized through the establishment of a Joint Force Fires Coordinator supported by a joint fires element. The broad, vague, and even contradictory doctrine currently used is not sufficient. The friction and difficulties experienced during the Gulf War indicate that operational fires need to be planned and coordinated at the joint staff level, not by a component commander and his staff. Future conflicts may not be fought under the ideal set of circumstances America enjoyed during Operation Desert Storm. Now is the time to refine joint doctrine, organize and train a joint fires staff, and create the Joint Force Fires Coordinator to ensure operational fires are maximized so that decisive force can be used to help shape and dominate whatever battlefield America fights on next.

## ENDNOTES

<sup>1</sup> *National Military Strategy of the United States of America*, (U.S. Government Printing Office, Washington DC, 1997), 5.

<sup>2</sup> *National Military Strategy of the United States of America*, (U.S. Government Printing Office, Washington DC, 1997), 20.

<sup>3</sup> "Joint Vision 2010," *Joint Forces Quarterly*. (Summer 1996), 38.

<sup>4</sup> Department of the Army, *TRADOC PAM 11-9, Blueprint of the Battlefield*, (Fort Monroe, VA: September 1993), 6-1 - 6-7. The six operating systems at the operational level of war are movement & maneuver, fires, protection, command and control, intelligence, and support. These differ from the seven battlefield operating systems which define functions at the tactical level of war and include: maneuver, fire support, air defense, command and control, intelligence, mobility/survivability, and combat service support. Although several of the functions at the two different levels share the same name, their subordinate functions, joint nature, and relationship to tactical, operational, and strategic objectives make each unique.

<sup>5</sup> U.S. Army. *Field Manual 101-5-1 Operational Terms and Graphics*. Department of the Army, Washington DC, 30 September 1997, 1-66. The Army defines fire support as "The collective and coordinated integration and synchronization of the fires and effects of armed aircraft, land-based and sea-based indirect fire systems, and electronic warfare systems that *directly support* combat forces against ground targets to delay, disrupt, or destroy enemy forces, combat formations, and facilities in pursuit of operational and tactical objectives."

<sup>6</sup> Department of the Army, *TRADOC PAM 11-9, Blueprint of the Battlefield*, Final Draft (September 1993), C-4.

<sup>7</sup> Reece, Ralph G., "Operational Fires." (Maxwell Air Force Base, AL: Air University, 1989), 10.

<sup>8</sup> Joint Chiefs of Staff Pub 3-03, *Doctrine for Joint Interdiction Operations*. (Washington, DC: U.S. Government Printing Office, 1995), v. Joint doctrine defines interdiction as "an action to divert, disrupt, delay, or destroy the enemy's surface military potential before it can be used effectively against friendly forces." The primary means of accomplishing interdiction is through the use of "fires" or "firepower."

<sup>9</sup> William J. Perry, "Technology for the 21st Century Warfare," *1996 Annual Defense Report to the President and the Congress*. (Washington, DC: U.S. Government Printing Office, March 1996), 83-84.

<sup>10</sup> P. J. Walsh, Project Leader. *Assessment of Organizational Options for Deep Attack*, IDA Paper P-3099. (Alexandria, VA: Institute for Defense Analyses), June 1995, 3.

<sup>11</sup> Oscar, Kenneth J. "Fielding a Versatile Army Today to Meet Tomorrow's Challenges." *Army*, Volume 47, No. 10, October 1997, 32.

<sup>12</sup> David T. Zabecki, *Steel Wind: Colonel Georg Bruchmuller and the Birth of Modern Artillery*. (Westport, CT: Praeger Publishers, 1994), 41-42. Bruchmuller first organized long-range artillery groups, called fernkampfar tillerie (FEKA), for the specific purpose of conducting deep attacks. They proved extremely successful on the Eastern Front at the decisive Battle of Riga, and when utilized on the Western Front, they helped the Germans penetrate British defenses at the Battle of the Somme.

<sup>13</sup> *Ibid.*, 41-42.



- 
- <sup>14</sup> Bailey, J.B.A. *Field Artillery and Firepower*. (New York: The Military Press, 1989), 134 & 151.
- <sup>15</sup> William W. Momyer, *Air Power in Three Wars*. (Washington, DC: U. S. Government Printing Office, 1978), 40.
- <sup>16</sup> Harold T. Gonzales, *Tactical Air Support of Ground Forces in the Future*, Research Report Number AU-ARI-89-7. (Maxwell Air Force Base, AL: Air University Press, May 1990), 25-27.
- <sup>17</sup> John A. Warden, III, *The Air Campaign: Planning for Combat*. (Washington, DC: National Defense University Press, 1988), 89.
- <sup>18</sup> Price T. Bingham, "Ground Maneuver and Air Interdiction in the Operational Art," *Parameters*. (March 1989), 19.
- <sup>19</sup> Warden, 90.
- <sup>20</sup> Alan Levine, *The Strategic Bombing of Germany, 1940-1945*. (Westport, CT: Praeger, 1992), 129.
- <sup>21</sup> Field Marshall Erwin Rommel, edited by B. H. Liddell Hart, *The Rommel Papers*. (Pennington, NJ: Collectors Reprints, Inc., 1953), 476-477.
- <sup>22</sup> Charles Messenger, *Bomber Harris and the Strategic Bombing Offensive, 1939-1945*. (London: Arms and Armor Press, 1984), 117.
- <sup>23</sup> MAJ Jonathan B. Hunter, "Joint Operational Targeting: Who's In Charge; CINC, JFACC, or JTCB?" (Fort Leavenworth, KS: Command and General Staff College, 1994), 18-19. Problems with unity of command in the planning and execution of operational fires was noted in an analysis done by MAJ Leonard G. Tokar, Jr., "U.S. Doctrine for Command and Control of Operational Fires." (Fort Leavenworth, KS: Command and General Staff College, 1996), 23.
- <sup>24</sup> Alan Levine, *The Strategic Bombing of Germany, 1940-1945*. (Westport, CT: Praeger, 1992), 162. The establishment of the Combined Strategic Targets Committee in the fall of 1944 helped address the need for a joint/combined organization to facilitate the targeting process at the strategic level. The CSTC was the conceptual predecessor of the Joint Targeting Coordination Board.
- <sup>25</sup> U.S. War Department, *Field Manual 6-20, Field Artillery Tactics and Techniques*, (Washington, DC: U.S. Government Printing Office, 1940), 40-43.
- <sup>26</sup> U.S. War Department Field Service Regulations, *Field Manual 100-5, Operations*. (Washington, DC: U.S. Government Printing Office, 1941), 13.
- <sup>27</sup> Department of the Army, *Field Manual 6-20-1, Field Artillery Tactics*. (Washington, DC: US Government Printing Office, 1961), 30-31.
- <sup>28</sup> Department of the Army, *Field Manual 6-20, Fire Support in Combined Arms Operations*. (Washington, DC: US Government Printing Office, 1977), D-4.
- <sup>29</sup> Department of the Army, *Field Manual 100-5, Operations*. (Washington, DC: US Government Printing Office, 1976), 8-1.
- <sup>30</sup> Harold R. Winton, "Partnership and Tension: The Army and Air Force Between Vietnam and Desert Shield," *Parameters*, XXVI, No. 1 (Spring 1996), 104-105.

- 
- <sup>31</sup> Ibid. (WINTON), 105-106.
- <sup>32</sup> Department of the Army, *Field Manual 100-5, Operations*. (Washington, DC: US Government Printing Office, 1982), 2-3.
- <sup>33</sup> Ibid., 2-1.
- <sup>34</sup> Department of the Army, *Field Manual 6-20, Fire Support in Combined Arms Operations*. (Washington, DC: US Government Printing Office, 1983), E-2.
- <sup>35</sup> Department of the Army, *Field Manual 100-5, Operations*. (Washington, DC: US Government Printing Office, 1986), 28.
- <sup>36</sup> Winton, 108.
- <sup>37</sup> Ibid., 108.
- <sup>38</sup> MAJ Robert F. Barry, II., "Who's Zooming Who? Joint Doctrine and the Army-Air Force Debate Over the FSCL." (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1994), 5.
- <sup>39</sup> Ibid., 8-9.
- <sup>40</sup> Winton, 113.
- <sup>41</sup> GEN Dennis J. Reimer, USA, and GEN Ronald R. Fogleman, USAF. "Joint Warfare and the Army-Air Force Team." *Joint Forces Quarterly*, No. 11, (Spring 1996), 10.
- <sup>42</sup> LTC Reamer A. Argo, III., "Force XXI Precision Engagement: The Need for a Joint Force Fire Coordinator." (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1997), 6-7.
- <sup>43</sup> John A. Warden, III, *The Air Campaign: Planning for Combat*. (Washington, DC: National Defense University Press, 1988), 169.
- <sup>44</sup> *Concepts in Airpower for the Campaign Planner*. (Maxwell AFB, AL: Air Command and Staff College, 1993), 8-17.
- <sup>45</sup> Department of the Army, *Field Manual 100-5, Operations*. (Washington, DC: US Government Printing Office, 1993), 1-1.
- <sup>46</sup> Ibid., 1-4.
- <sup>47</sup> Ibid., 2-0.
- <sup>48</sup> Department of the Army, *Field Manual 100-15, Corps Operations*. (Washington, DC: US Government Printing Office, 1996), 2-4.
- <sup>49</sup> *FM 100-5, Operations*., 2-18.
- <sup>50</sup> Ibid., 6-14. The Army's current doctrinal publication recognizes that "the enemy is best defeated by fighting him close and deep simultaneously." This operational concept grows in importance with the development of the Army's Force XXI.

---

<sup>51</sup> *FM 100-15*, 4-11; and *FM 100-7, The Army in Theater Operations*. (Washington, DC: US Government Printing Office, 1995), 5-9 and 7-6.

<sup>52</sup> Department of the Army, *Field Manual 100-7, The Army in Theater Operations*. (Washington, DC: US Government Printing Office, 1995), 7-6.

<sup>53</sup> *FM 100-7, The Army in Theater Operations*., 7-6.

<sup>54</sup> *FM 100-7, The Army in Theater Operations*., 7-9.

<sup>55</sup> Department of the Army, *Field Manual 6-20-10, Tactics, Techniques, and Procedures for The Targeting Process*. (Washington, DC: US Government Printing Office, 1996), I-1.

<sup>56</sup> *Ibid.*, I-1.

<sup>57</sup> *FM 100-7, The Army in Theater Operations*., 5-9.

<sup>58</sup> *FM 6-20-10, Tactics, Techniques, and Procedures for The Targeting Process*., I-1.

<sup>59</sup> Department of the Air Force, *Air Force Doctrine Document 1, Air Force Basic Doctrine*. (Washington, DC: US Government Printing Office, 1997), 1.

<sup>60</sup> Department of the Air Force, *AFM 1-1, Basic Aerospace Doctrine of the United States Air Force*. (Washington, DC: US Government Printing Office, 1993), 6-7. *AFDD 1, Air Force Basic Doctrine*, 1997, further defines the functions of air and space power, however, the longer list of functions still fit into the four broad roles identified in the 1993 basic doctrinal manual.

<sup>61</sup> *AFDD 1, Air Force Basic Doctrine*., 46-47.

<sup>62</sup> *Ibid.*, 13.

<sup>63</sup> *Ibid.*, 22-23, and 25-26.

<sup>64</sup> *Ibid.*, 26.

<sup>65</sup> *Ibid.*, 21-27. The seven tenets of airpower serve as "fundamental guiding truths of air and space power employment"(p.22).

<sup>66</sup> *Ibid.*, 22.

<sup>67</sup> Col J. L. Whitlow, USMC, "JFACC: Who's in Charge?" *Joint Forces Quarterly*, (No. 5, Summer 1994), 67.

<sup>68</sup> *AFDD 1, Air Force Basic Doctrine*., 23.

<sup>69</sup> "Joint Vision 2010: America's Military--Preparing for Tomorrow." *Joint Forces Quarterly*, (No. 12, Summer 1996), 47-48.

<sup>70</sup> Joint Chiefs of Staff, *Doctrine for Joint Fire Support*. Message 290441Z OCT88, as reported in MAJ William R. Fern's, "Joint Force Fires Coordination: Towards a Joint Force Answer." (Newport, RI: Naval War College, 1997), 6.

---

<sup>71</sup> MAJ William R. Fern's, "Joint Force Fires Coordination: Towards a Joint Force Answer." (Newport, RI: Naval War College, 1997), 6-7. These issues were debated at the Army-Air Force Warfighter Conference in December, 1996. A compromise resolution limited the original intent for JP 3-09 giving it more of a focus on joint support of land and amphibious forces rather than fires supporting the joint force at large.

<sup>72</sup> Joint Pub 3-09, *Doctrine for Joint Fire Support*, (Final Draft). (Baltimore, MD: USA AG Publications Center, 1991). III-1.

<sup>73</sup> Joint Chiefs of Staff Pub 3-03, *Doctrine for Joint Interdiction Operations*. (Washington, DC: U.S. Government Printing Office, 1995), v

<sup>74</sup> MAJ Robert F. Larsen, "The Role of Airpower," *Army Magazine*. (Vol. 48, No. 3, March 1998), 8-9.

<sup>75</sup> JCS Pub 3-03, *Doctrine for Joint Interdiction Operations*., vii

<sup>76</sup> *Ibid.*, vii

<sup>77</sup> Joint Chiefs of Staff Pub 3-0, *Doctrine for Joint Operations*. (Washington, DC: US Government Printing Office, 1995), III-10-12.

<sup>78</sup> JCS Pub 3-03, *Doctrine for Joint Interdiction Operations*., vii

<sup>79</sup> *Ibid.*, vi

<sup>80</sup> JCS Pub 3-0, *Doctrine for Joint Operations*., III-27.

<sup>81</sup> *Ibid.*, III-26.

<sup>82</sup> Joint Publication 3.09, *Doctrine for Joint Fire Support*, June 1991, (Final Draft), III-6.

<sup>83</sup> JCS Pub 3-03, *Doctrine for Joint Interdiction Operations*., III-27.

<sup>84</sup> *Ibid.*, II-2-3.

<sup>85</sup> FM 100-7, *The Army in Theater Operations*., 7-4.

<sup>86</sup> US Army, *TRADOC PAM 11-9, Blueprint of the Battlefield*, Final Draft (September 1993), 4-5.

<sup>87</sup> P. J. Walsh, Project Leader. *Assessment of Organizational Options for Deep Attack*, IDA Paper P-3099. (Alexandria, VA: Institute for Defense Analyses), June 1995, 57.

<sup>88</sup> JCS Pub 3-0, *Doctrine for Joint Operations*., xiii.

<sup>89</sup> JCS Pub 3-03, *Doctrine for Joint Interdiction Operations*., II-5.

<sup>90</sup> James A. Winnefeld; *A League of Airmen: U.S. Air Power in the Gulf War*. (Santa Monica, Rand Corporation, 1994), 67. A low level (two majors) informal Army review of Checkmate's plan, called "Instant Thunder" was made. "Checkmate had no provision to target the Iraqi forces poised on the Saudi border" and only modified the plan when directed by the Chairman, JCS, and the Secretary of Defense. Checkmate's plan embodied the belief of many in the Air Force that airpower could defeat the Iraqi's in a week through strategic attacks which would force Saddam Hussein to withdraw his forces from Kuwait.

---

BG Robert H. Scales, JR., USA. *Certain Victory: The U.S. Army in the Gulf War*, (Washington, DC: Brassey's, 1994), 176.

<sup>91</sup> Thomas A. Keaney and Eliot A. Cohen. *Gulf War Air Power Survey Summary Report*, (Washington, DC: U.S. Government Printing Office, 1993), 147-151.

<sup>92</sup> Richard M. Swain. *"Lucky War" Third Army in Desert Storm*. (Fort Leavenworth, KS: U.S. Army Command and General Staff College Press, 1994), 331.

<sup>93</sup> Keaney & Eliot, 147.

<sup>94</sup> Ibid., 153.

<sup>95</sup> Rick Atkinson. *Crusade*, (Boston: Houghton Mifflin and Company, 1993), 339.

<sup>96</sup> BG Robert H. Scales, JR., USA. *Certain Victory: The U.S. Army in the Gulf War*, (Washington, DC: Brassey's, 1994), 178.

<sup>97</sup> Ibid., 175.

<sup>98</sup> COL Thomas G. Waller, Jr., USA. "Fire and Thunder: Shaping the Battlespace with Operational Fires," (Newport, RI: Naval War College, 1995), 17.

<sup>99</sup> Scales, 193-194.

<sup>100</sup> MAJ Mark S. Jensen, USA. "MLRS in Operation Desert Storm," *Field Artillery*, (August 1991), 33.

<sup>101</sup> LtCol. Steven E. Whittenberg, USAF., "Joint Doctrine: The Army/Air Force Disconnect," Naval War College Report, (Newport, RI: Naval War College, 1992), 20.

<sup>102</sup> GEN Dennis J. Reimer, USA, and GEN Ronald R. Fogleman, USAF. "Joint Warfare and the Army-Air Force Team." *Joint Forces Quarterly*, No. 11, (Spring 1996), 10.

<sup>103</sup> Ibid., 10.

<sup>104</sup> Scales, 175-176.

<sup>105</sup> Reimer & Fogleman, 10.

<sup>106</sup> Michael R. Gordon and LTG Bernard E. Trainor, USMC. *The General's War*, (New York: Little, Brown and Co., 1995), 310.

<sup>107</sup> Scales, 180.

<sup>108</sup> Ibid., 180-181..

<sup>109</sup> MAJ Jonathan B. Hunter, USA. "Joint Operational Targeting: Who's In Charge; CINC, JFACC or JTCB?" (Ft. Leavenworth, KS: U.S. Army Command and General Staff College, 1994), 35.

<sup>110</sup> LTC William G. Welch, USA. "Notes from the BCE: Observations on Joint Combat Operations at Echelons Above Corps," *Field Artillery* (June 1992), p.18.

---

<sup>111</sup> Ibid., p.18. LTC Welch noted some of the unique characteristics of the Gulf War included: very exposed target arrays that moved very little, if at all; excellent terrain and weather conditions to exploit high tech means of targeting and engagement; poorly led, undisciplined, and unmotivated enemy; and A cooperative enemy which allowed a significant period of time for American forces to deploy, prepare, and plan for combat operations.

<sup>112</sup> Joint Publication 1, *Joint Warfare of the U.S. Armed Forces*. (Washington, DC: US Government Printing Office, 1991), iii.

<sup>113</sup> LTC Sammy L. Coffman, USA. "Fighting with Fires," *Field Artillery Journal*, (June 1992), 13.

<sup>114</sup> Albert R. Hochevar, James A. Robards, John M. Schafer, and James M. Zepka. "Deep Strike: The Evolving Face of War." *Joint Forces Quarterly*, No. 9, (Autumn 1995), 81.

<sup>115</sup> P. J. Walsh, Project Leader. *Assessment of Organizational Options for Deep Attack*, IDA Paper P-3099. (Alexandria, VA: Institute for Defense Analyses), June 1995, 4.

<sup>116</sup> LtCol Terry L. New, USAF. "Where to Draw the Line Between Air and Land Battle." *Airpower Journal*, Vol X, No. 3 (Fall 1996). LtCol New advocates the formal use of the FSCL as the line that divides the responsibilities between the Army and the Air Force, and thus he believes the air commander should be given greater involvement in the placement of the FSCL.

<sup>117</sup> P. J. Walsh, Project Leader. *Assessment of Organizational Options for Deep Attack*, IDA Paper P-3099. (Alexandria, VA: Institute for Defense Analyses), June 1995, 7.

<sup>118</sup> MAJ William R. Fearn, USMC. "Joint Force Fires Coordination: Towards a Joint Force Answer." (Newport, RI: Naval War College, 13 June 1997), 13-14.

<sup>119</sup> JCS Pub 3-0, *Doctrine for Joint Operations*., ix

<sup>120</sup> "Joint Vision 2010," *Joint Forces Quarterly*. (Summer 1996), 39.

<sup>121</sup> *TRADOC PAM 11-9, Blueprint of the Battlefield*, Final Draft (September 1993), C-4.

## BIBLIOGRAPHY

### Manuals

- U.S. Joint Chiefs of Staff. *Joint Pub 1, Joint Warfare of the US Armed Forces*. Washington, DC: U.S. Government Printing Office, 1995.
- U.S. Joint Chiefs of Staff. *Joint Pub 1-02, Department of Defense Dictionary*. Washington, DC: U.S. Government Printing Office, 1995.
- U.S. Joint Chiefs of Staff. *Joint Pub 3-0, Doctrine for Joint Operations*. Washington, DC: U.S. Government Printing Office, 1995.
- U.S. Joint Chiefs of Staff. *Joint Pub 3-03, Doctrine for Joint Interdiction Operations*. Washington, DC: U.S. Government Printing Office, 1995.
- U.S. Joint Chiefs of Staff. *Joint Pub 3-09, Doctrine for Joint Fire Support, Second Draft*. Washington, DC: U.S. Government Printing Office, 1995.
- U.S. Joint Chiefs of Staff. *Joint Pub 3-55, Doctrine for Reconnaissance, Surveillance, and Target Acquisition Support for Joint Operations*. Washington, DC: U.S. Government Printing Office, 1993.
- U.S. Joint Chiefs of Staff. *Joint Pub 3-56.1, Command and Control for Joint Air Operations*. Washington, DC: U.S. Government Printing Office, 1994.
- U.S. Department of the Army. *Field Manual 6-20, Fire Support in Combined Arms Operations*. Washington, DC: U.S. Government Printing Office, 1988.
- U.S. Department of the Army. *Field Manual 6-20-1, Field Artillery Tactics*. Washington, DC: U.S. Government Printing Office, 1961.
- U.S. Department of the Army. *Field Manual 6-20-2, Tactics, Techniques, and Procedures for Corps Artillery, Division Artillery, and Field Artillery Brigade Headquarters*. Washington, DC: U.S. Government Printing Office, 1993.
- U.S. Department of the Army. *Field Manual 6-20-10, The Targeting Process*. Washington, DC: U.S. Government Printing Office, 1996.
- U.S. Department of the Army. *Field Manual 6-20-30, Tactics, Techniques, and Procedures for Fire Support for Corps and Division Operations*. Washington, DC: Government Printing Office, 1990.
- U.S. Department of the Army. *Field Manual 100-5, Operations*. Washington, DC: U.S. Government Printing Office, 1976.

- U.S. Department of the Army. *Field Manual 100-5, Operations*. Washington, DC: U.S. Government Printing Office, 1982.
- U.S. Department of the Army. *Field Manual 100-5, Operations*. Washington, DC: U.S. Government Printing Office, 1986.
- U.S. Department of the Army. *Field Manual 100-5, Operations*. Washington, DC: U.S. Government Printing Office, 1993.
- U.S. Department of the Army. *Field Manual 100-5 (Final Draft), Operations*. Washington, DC: U.S. Government Printing Office, 5 August 1997.
- U.S. Department of the Army. *Field Manual 100-7, Decisive Force: The Army in Theater Operations*. Washington, DC: U.S. Government Printing Office, 1995.
- U.S. Department of the Army. *TRADOC PAM 11-9, Blueprint of the Battlefield*, Fort Monroe, VA: Department of the Army 1990.
- U.S. Department of the Army. *TRADOC PAM 525-5. Force XXI Operations*. Fort Monroe, VA: Department of the Army, 1994.
- U.S. Department of the Army. *TRADOC PAM 525-200-5. Depth and Simultaneous Attack*. Fort Monroe, VA: Department of the Army, 1994.
- U.S. Department of the Army, U.S. Army Field Artillery School. "Joint Fire Support and Interdiction: Conduct of Operations Between the Fire Support Coordination Line and the Forward Boundary." (A White Paper). Fort Sill, OK: 15 August 1994.
- U.S. Department of the Air Force. *Joint Force Air Component Commander (JFACC) Primer*. Washington, DC: U.S. Government Printing Office, 1994.
- U.S. Department of the Air Force. *Air Force Doctrine Document 1, Air Force Basic Doctrine*. Washington, DC: U.S. Government Printing Office, 1997.
- U.S. Department of the Navy. *FMFM 1-1, Campaigning*. Washington, DC: U.S. Government Printing Office, 1990.
- U.S. War Department. *Field Manual 6-20, Field Artillery Tactics and Techniques*. Washington, DC: U.S. Government Printing Office, 1940.
- U.S. War Department Field Service Regulations. *Field Manual 100-5, Operations*. Washington, DC: U.S. Government Printing Office, 1941.



## Books

- Atkinson, Rick. *Crusade*. Boston: Houghton Mifflin Company, 1993.
- Bailey, J.B.A. *Field Artillery and Firepower*. New York: The Military Press, 1989.
- Barnett, Jeffery R. *Future War: An Assessment of Aerospace Campaigns in 2010*. Maxwell AFB, Alabama: Air University Press, 1996.
- Bellamy, Christopher. *The Future of Land Warfare*. New York: St. Martin's Press, 1987.
- Bellamy, Christopher. *The Evolution of Modern Land Warfare, Theory and Practice*. London: Routledge, 1990.
- Cardwell, Thomas A., III. *Airland Combat: An Organization for Joint Warfare*. Maxwell AFB, Alabama: Air University Press, 1992.
- Clausewitz, Carl von. *On War*, Edited and translated by Michael Howard and Peter Paret. Princeton, NJ: Princeton University Press, 1976.
- Cohen, Eliot A. and John Gooch., *Military Misfortunes: The Anatomy of Failure in War*. New York: The Free Press, 1990.
- Gordon, Michael R. and LTG Bernard E. Trainor. *The General's War: The Inside Story of the Conflict in the Gulf*. New York: Little, Brown, and Company, 1995.
- Johnson, Dana J. and James A. Winnefeld., *Joint Air Operations: Pursuit of Unity in Command and Control, 1942-1991*. Annapolis, Maryland: Naval Institute Press, 1993.
- Keany, Thomas A. and Eliot A. Cohen. *Gulf War Air Power Survey Summary Report*. Washington, DC: U.S. Government Printing Office, 1993.
- Levine, Alan J., *The Strategic Bombing of Germany, 1940-1945*. Wesport, CT: Praeger Publishers, 1992.
- McKnight, Clarence E., ed. *Control of Joint Forces, A New Perspective*. Fairfax, VA: Armed Forces Communications and Electronics Association International Press, 1989.
- Messenger, Charles. *Bomber Harris and the Strategic Bombing Offensive, 1939-1945*. London: Arms and Armor Press, 1984.

- Momyer, William W. *Air Power in Three Wars*. Washington, DC: U. S. Government Printing Office, 1978.
- Scales, Robert H., Brigadier General, USA. *Certain Victory: The U.S. Army in the Gulf War*. Washington, DC: Brassey's, 1994.
- Simpkin, Richard E. *Race to the Swift; Thoughts on Twenty-First Century Warfare*. New York: Brassey's Defence Publishers, 1985.
- Swain, Richard M. "Lucky War" *Third Army in Desert Storm*. Fort Leavenworth, KS: U.S. Army Command and General Staff College, 1994.
- Warden, John A., III. *The Air Campaign: Planning for Combat*. Washington, DC: National Defense University Press, 1988.
- Winnefeld, James A., Preston Niblack, and Dana A. Johnson. *A League of Airmen: U.S. Air Power in the Gulf War*. Santa Monica, CA: Rand Corporation, 1994.
- Zabecki, David T. *Steel Wind: Colonel Georg Bruchmuller and the Birth of Modern Artillery*. Westport, CT: Praeger Publishers, 1994.

#### Articles

- Anderson, Edward G., MG, USA and LTC John Gordon IV. "Deep Battle: An Army Perspective." *Army Magazine*, Volume 45, No. 3 (March 1995): 9-15.
- Bingham, Price T. "Ground Maneuver and Air Interdiction in the Operational Art." *Parameters* (March 1989):
- Boyd, Morris J., BG, USA and MAJ Michael Woodgerd. "Force XXI Operations." *Military Review*, LXXIV (November 1994): 17-28.
- Clauer, John, Col, USMC. "Future Warfare: Preparing for the 21st Century, A Common Perspective." *Joint Warfighting Center's Newsletter*, (October, 1996): 6.
- Cline, Dennis C., COL, USA and LTC Joe G. Taylor, Jr. "Deep Interdiction--The MLRS Deep Strike Option." *Field Artillery*, (April 1993): 26-31.
- Franks, Frederic M., GEN, USA. "Full Dimensional Operations: A Doctrine for an Era of Change." *Military Review*, LXXIII (December 1993): 8.
- Haynes, Forest D., III, MAJ, USA. "Synchronizing the Divisional Deep Fight." *Field Artillery*, (April 1993): 21-25.
- Herbert, Paul H., COL, USA. "Targeting-- A Force XXI Combined Arms Concept."

- Field Artillery*, (January-February 1996), 8-10.
- Hester, Henry M., CPT, USA and Marc F. Mann. "Targeting via AFATDS." *Field Artillery*, (January-February 1996), 26-29.
- Hilliard, Jay, MAJ, USA. "ATACMS Block II: Killing Armored Targets Deep." *Field Artillery*, (January-February 1996), 22-24
- Hochevar, Albert R., James A. Robards, John M. Schafer, and James M. Zepka, "Deep Strike: The Evolving Face of War." *Joint Forces Quarterly*, (Autumn 1995): 80-85.
- Jensen, Mark S., MAJ, USA. "MLRS in Operation Desert Storm." *Field Artillery*, (August 1991): 30-34.
- Larsen, Robert F., MAJ, USA. "The Role of Airpower." *Army Magazine*, Volume 48, No. 3 (March 1998): 8-10.
- Lewis, Richard B., Col, USAF. "JFACC, Problems Associated with Battlefield Preparation in Desert Storm." *Airpower Journal*, (Spring 1994): 4-6.
- Kolditz, Thomas, MAJ, USA and COL Niel E. Nelson. "RAIDS--Fire Coordination for Aviation in the Deep Battle." *Field Artillery*, (February 1995): 24-26.
- Macgregor, Douglas A., "Future Battle--The Merging Levels of War." *Parameters*, Volume XXII (Fall-Winter 1992-1993): 33-47.
- McCabe, Thomas R., MAJ, USAF. "Limits of Deep Attack." *Airpower Journal*, Volume 7, No. 3 (Fall 1993): 4-14.
- McQuie, Robert. "Battle Outcomes: Casualty Rates as a Measure of Defeat." *Army Magazine*, Volume 37, No. 11 (November 1987): 30-34.
- Odierno, Raymond T., COL, USA and Thomas L. Swingle. "AFATDS: Digitizing Fighting with Fires." *FA Journal*, Volume 1, No. 4 (September-October 1996): 14-16.
- Otis, Glenn K., GEN, USA. "Ascendancy of Fires: The Evolution of the Combined Arms Team." *Field Artillery*, (June 1995): 18-19.
- Reimer, Dennis J., and Ronald R. Fogleman. "Joint Warfare and the Army-Air Force Team." *Joint Forces Quarterly*, No. 11 (Spring 1996): 9-15.
- Rigby, Randall L., MG, USA. "Mapping the Future: FA State of the Branch 1996." *FA Journal*, Volume 1, No. 5 (November-December 1996): 1-6.

- Romjue, John L., "The Evolution of the AirLand Battle Concept." *Air University Review*, (May-June 1984): 10-15.
- Stambaugh, Jeffrey E. "JFACC: Key to Organizing Your Air Assets for Victory." *Parameters*, Volume XXIV, No. 2 (Summer 1994): 98-110.
- Wealch, William G. "Observations on Joint Combat Operations at Echelons Above Corps." *Field Artillery Journal*. (June 1992).
- Winton, Harold R. "Partnership and Tension: The Army and Air Force Between Vietnam and Desert Shield." *Parameters*, Volume XXVI, No. 1 (Spring 1996): 100-119.
- Yager, John K. and Jeffery L. Froysland. "Improving the Effects of Fires with Precision Munitions." *FA Journal*, Volume II, No. 2 (March-April 1997): 5-7.

#### Manuscripts

- Argo, Reamer A., III, LTC, USA. "Force XXI Precision Engagement: The Need for a Joint Force Fire Coordinator." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1997.
- Barry, Robert F., III, MAJ, USA. "Who's Zooming Who? Joint Doctrine and the Army-Air Force Debate Over the FSCL." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1994.
- Bond, William L., COL, USA. "Targeting for Army Deep Attack." Executive Research Project, The Industrial College of the Armed Forces, National Defense University, 1992.
- Bowdish, Randall G., LtCdr, USN. "A Theater-level Integrated Sensor-to-Shooter Capability and its Operational Implications." Research Paper, Naval War College, 1995.
- Burgess, John C., Jr., LtCol, USAF. "Operational Fires: Maximizing Effectiveness." Research Paper, Naval War College, 1996.
- Corpac, Peter S., MAJ, USA. "AirLand Battle Future--Fires: How Do You Do It?" Research Paper, Naval War College, 1991.
- Fern, William R., MAJ, USMC. "Joint Force Fires Coordination: Towards a Joint Force Answer." Advanced Research Project, Naval War College, 1997.

- Hammond, Charles O., MAJ, USA. "Operational Fires and Unity of Command." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1990.
- Hunter, Jonathan B., MAJ, USA. "Joint Operational Targeting: Who's In Charge; CINC, JFACC or JTCB?" Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1994.
- Jauron, Lester C., MAJ, USA. "Corps Aviation Brigade Deep Operations: Toward a Sharper Spear." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1992.
- Kelly, Thomas P., LTC, USMC. "Operational Fires: Past, Present, and Future." Research Project, Naval War College, 1995.
- Kolditz, Thomas A., MAJ, USA. "Exploring the Conditions for Decisive Operational Fires." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1993.
- McCracken, Matthew T., MAJ, USA. "Understanding Operational Fires and Interdiction." Research Paper, Naval War College, 1993.
- Moore, Lawrence W., MAJ, USA. "The Mounted Raid: An Overlooked Deep Operations Capability." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1991.
- Rice, William J., LTC, USA. "Operational Fires--What's In A Name?" Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1990.
- Skattum, Mark H., LtCol, USAF. "Deep Battle: Who's In Charge?" Strategic Research Project, U.S. Army War College, 1996.
- Sullivan, Michael P., LtCol, USAF. "Revolution in Military Affairs: Its Impact on Operational Fires and the Future Battlefield." Strategy Research Project, U.S. Army War College, 1996.
- Tokar, Leonard G., Jr., MAJ, USA. "U.S. Doctrine for Command and Control of Operational Fires." Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, 1996.
- Waller, Thomas G., COL, USA. "Fire and Thunder: Shaping the Battlespace with Operational Fires." Research Paper, Naval War College, 1995.

## Other Works

Walsh, P. J., G. A. Corliss, R. L. Craft, J. L. Gerrity, and R. D. Turner. *Assessment of Organizational Options for Deep Attack*. IDA Paper P-3099, Institute for Defense Analyses, Alexandria, VA, June 1995.

Coroalles, Anthony M., and Gordon R. Sullivan. *The Army in the Information Age*. Carlisle Barracks, Pennsylvania: Strategic Studies Institute, U.S. Army War College, March 31, 1995

Dubik, James M., and Gordon R. Sullivan. *Land Warfare in the 21st Century*. Carlisle Barracks, Pennsylvania: Strategic Studies Institute, U.S. Army War College, February, 1993.

Gonzales, Harold T. *Tactical Air Support of Ground Forces in the Future*. Research Report Number AU-ARI-89-7. Maxwell Air Force Base, AL: Air University Press, March 1991.

Nichiporuk, Brian and Carl H. Builder. *Information Technologies and the Future of Land Warfare*. RAND Research Report. Santa Monica, CA: RAND, 1995.

"Deep Operations Coordination Cell Analysis." Technical Report TRAC-TR-1394, TRADOC Analysis Center. Ft Leavenworth, KS, November 1994.

"Joint Vision 2010: America's Military Preparing for Tomorrow." *Joint Forces Quarterly*, No. 12, Summer 1996, 34-49.

*Concepts in Airpower for the Campaign Planner*. Air Command and Staff College. Maxwell AFB, AL, 1993.